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Blood:
The Stream of Life

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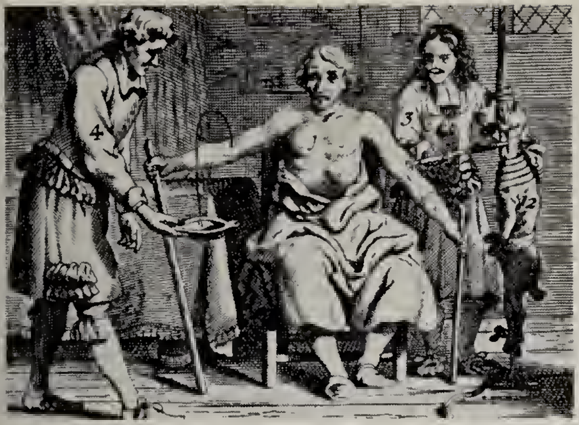

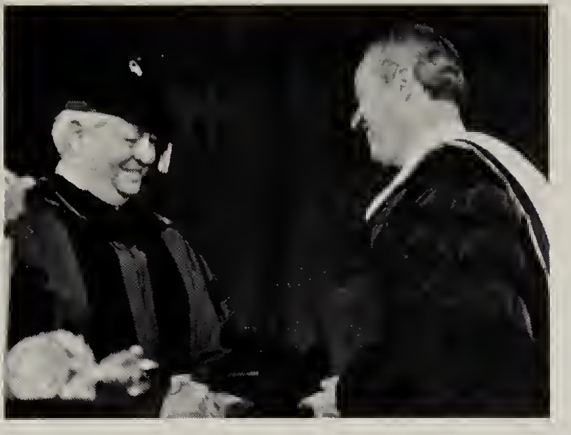

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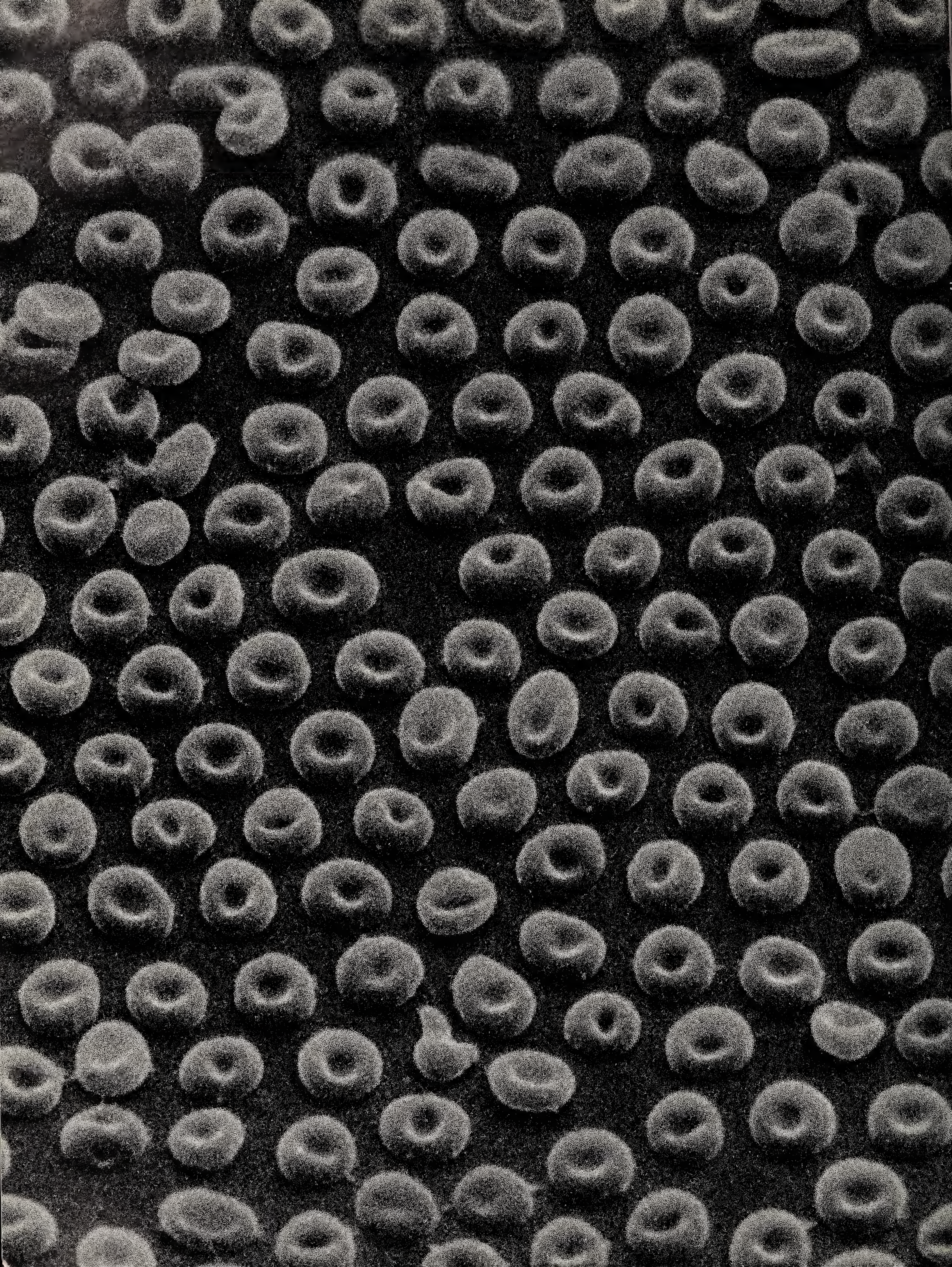
On the cover: Illustration depicts a cross-section of an artery showing blood components as they exit the bone marrow.



Blood: The Stream of Life

By Janice Perrone

Facing page: natural red blood cells, exhibiting characteristic doughnut shape.

It's a complex, remarkable fluid, blood. This rich red substance has been recognized since ancient times as the very essence of life. Poets have written about it. Researchers have studied it, discovering such important scientific truths that the practice of medicine was revolutionized and new fields of science were either born or immeasurably enhanced.

What is this substance, blood?

Approximately 55 percent of blood is a yellow liquid, plasma, and the remaining 45 percent is divided into three components: red blood cells, white blood cells, and platelets. Blood constitutes seven or eight percent of a person's body weight.

The red blood cells serve as part of the body's transportation system. They carry hemoglobin, a protein that gives blood its red color, in a form that delivers oxygen from the lungs to the body's cells. On the return trip, they carry carbon dioxide and other waste products of cells to organs of elimination, such as the lungs, skin, kidneys, and liver, to be discharged.

The white cells are not as numerous as the red but are just as vital. They provide the body's defense mechanism against the infectious diseases to which people are constantly exposed.

The platelets are tiny, only one-thousandth of a millimeter in diameter. But en masse they are a powerful example of strength in numbers. Clumped together they become blood clots, plugging up holes in damaged blood vessels and starting the coagulation process that prevents a person from bleeding to death.

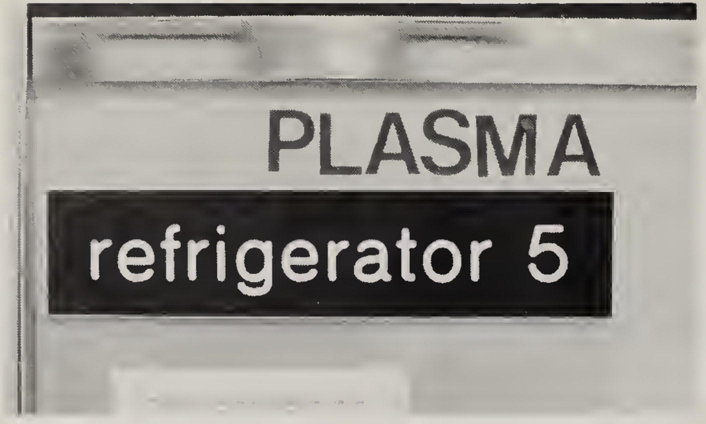
Proteins carried by the plasma assist the other blood components in their jobs and perform several critical functions of their own. Plasma transports proteins that identify foreign substances and assist the white cells in their defense mechanism (antibodies and the complement system). It also carries 13 clotting factors that help the platelets form blood clots. But most of the plasma proteins are albumin molecules that maintain the proper amount of water in blood and also do their share of the transportation work. For example, they carry a thyroid-regulating hormone from the pituitary gland, where it is made, to the thyroid so the thyroid will work at the proper speed. Without this transportation system, the cells of the body wouldn't get the supplies necessary to get their individual jobs done.

To perform these functions, blood is pumped by the heart through the body in a complex system of arteries, veins, and capillaries. These are the rivers and tributaries branching out through the body, carrying blood, the stream of life.

Historical Perspective

That people thought about blood and realized its association with the heart as long ago as Paleolithic times is clear from the drawings of cave dwellers. But perhaps the first written medical doctrine relating blood to health was Hippocrates' doctrine of the four humors, written about 400 B.C. Hippocrates believed that the human body was made up of four humors—black bile, blood, phlegm and yellow bile—and that disease was the consequence of their imbalance. This theory dominated medical thinking well into the sixteenth century.

The ancient Greeks may have based the theory of the four



Sixteenth century woodcut shows bloodletting procedure.

humors on observing that when blood stands in a container it separates into four distinct layers: at bottom, a dark red, almost black, thick substance; above it, a layer of red fluid; next, a pale green or whitish layer, and, at top, a yellow liquid. Today these layers are known to be, beginning again at the bottom, deoxygenated red cells, then red cells with more oxygen (and therefore more reddish in color than the bottom layer), white cells, and, at the top, plasma. Because the phlegm, the whitish layer, consists mostly of white blood cells, it was more readily seen in the blood of people who were ill. Hippocrates assumed, therefore, that it caused disease. It wasn't until many centuries later that physicians realized that the phlegm appeared as a result of, rather than the cause of, an illness.

The Greeks attempted to remove this bad humor, the phlegm, rid the body of disease and restore the vigor of life by bleeding patients. Bloodletting became such an accepted and ingrained medical practice that physicians prescribed it until the mid-nineteenth century. It was strongly advocated even by eminent physicians, including Benjamin Rush, the man for whom Rush Medical College was named.

But not only did bloodletting have no medicinal value, in all likelihood it had a detrimental effect on patients. During a yellow fever epidemic in Philadelphia in 1793, bloodletting was prescribed almost uniformly and probably played a significant role in the high mortality rate. Its prescription affected the terminal illness of George Washington as well as many patients who were literally bled to death.

Physicians were slow to realize that it's the opposite form of therapy, blood transfusion, that is beneficial and why it's beneficial. As late as the fifteenth century, on occasions when blood was recommended as medical treatment, it was usually for conditions such as lunacy, fits, or a bad disposition rather than for blood loss. Until the seventeenth century patients probably drank blood; physicians didn't begin to experiment with blood transfusions until 1628 when William Harvey discovered the circulation of the blood. In 1667 there were several successful transfusions and patient recoveries in England and France, but that was also the year a deranged man in Paris died after a blood transfusion. The incident slowed the progress of transfusing blood for almost 150 years as the established medical societies at the time succeeded in having the procedure banned.

It's somewhat surprising that any transfusions were successful at this time considering that it was usually animal blood (and for a short time even milk) being transfused into patients. Even between humans there is at least a 35 percent reaction rate to be expected from chance incompatibility; immunological incompatibility is even greater between species. There was also the danger of infection and blood clots, since blood tends to clot within a few minutes of leaving blood vessels and anticoagulants had yet to be developed.

Gradually, these problems were overcome. Infection control began in 1867 with the introduction of antiseptics. To deal with the problem of blood clots, transfusions were often "direct" from animal to recipient so the transfer required the blood to be outside the vessels for as short a time as possible. Clots were also strained out of blood not being directly transfused, and later sodium citrate was used to keep blood from clotting. By the turn of this century, physicians realized the incompatibility of blood between species, and, a few years later, Dr. Karl Landsteiner discovered the human blood groups. This led to matching blood types of donors and patients, perhaps the most important step toward assuring blood compatability and the effectiveness of blood therapy.

The Blood Center

Once anticoagulants were developed, it became possible to store blood for later use. In 1915 a New York physician noted that citrated blood could be stored in an ice box for several days and then transfused safely; and a few years later, late in World War I, it was shown that blood preserved in a citrate-glucose solution could be used up to

"The coagulation system is doing its job more actively than it should when it leads to heart attacks or strokes."

Edmond R. Cole, Ph.D.

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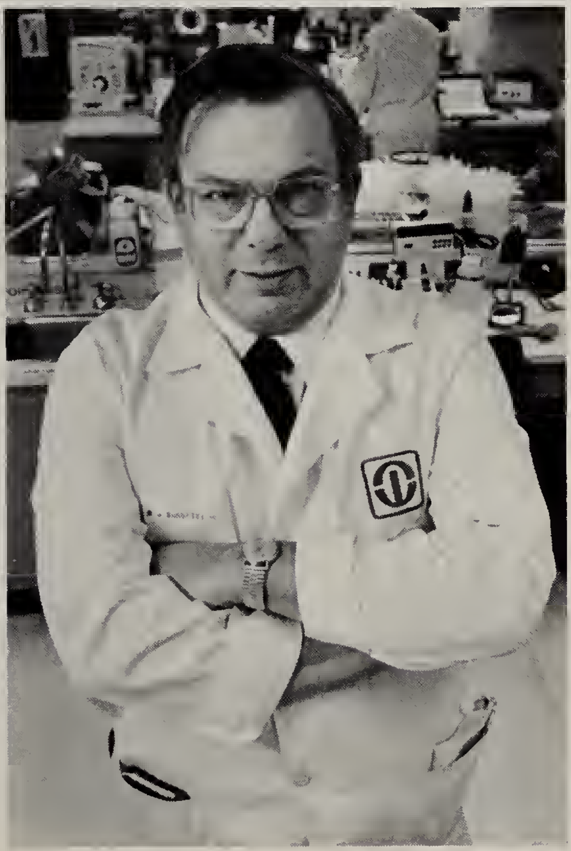
three weeks after it was collected. These early attempts to store blood eventually led to the development of blood banks.

Today more than three million Americans receive seven million units, or one million gallons of blood, in transfusions every year. Physicians routinely prescribe transfusions to treat a variety of blood disorders and to replace or maintain blood volume if an accident, hemorrhage or surgical procedure causes a sufficiently great loss of blood. The Blood Center of Rush-Presbyterian-St. Luke's Medical Center procures blood from about 8,000 donors every year, which supplies 40 percent of the 42,000 units of blood transfused at the Medical Center annually. The Red Cross and other suppliers provide the other 60 percent.

Refinements in transfusion methods have made it standard for blood components rather than whole blood to be used in treatment.



The Blood Center, directed by Richard J. Sassetti, M.D., supplies 40 per cent of the 42,000 units used each year at the Medical Center.

"Transfusing only blood components allows patients to get the elements they need without overloading their cardiovascular system" says Richard J. Sassetti, M.D., associate professor, internal medicine, and director of the Blood Center. "Anemic patients, for example, who have normal blood volume but low levels of hemoglobin, receive transfusions of just the red cells. Patients who have coagulation problems related to deficiencies in the clotting protein get the plasma, and patients who have bleeding deficiencies because of platelet abnormalities get the platelets."

Five components are rountinely separated out of blood collected at the Blood Center: packed red cells; platelets; plasma; white cells; and, from the plasma, an element called cryo-precipitate. These five substances can be processed down even further to separate out 13 more components which are needed to treat diseases that require just the one targeted element. In addition, pharmaceutical companies can supply other components that occur in the blood in quantities too small for the Blood Center to collect.

Although the number of units transfused has been increasing at the Medical Center at a fairly regular rate, there hasn't been a blood shortage in years. Dr. Sassetti credits this to improved cooperation between the blood centers in Chicago and new developments in blood preservatives that allow red cells to be kept for 35 days instead of 21. Platelets, which are much more active metabolically, can only be stored for three to five days. Plasma will last about two years.

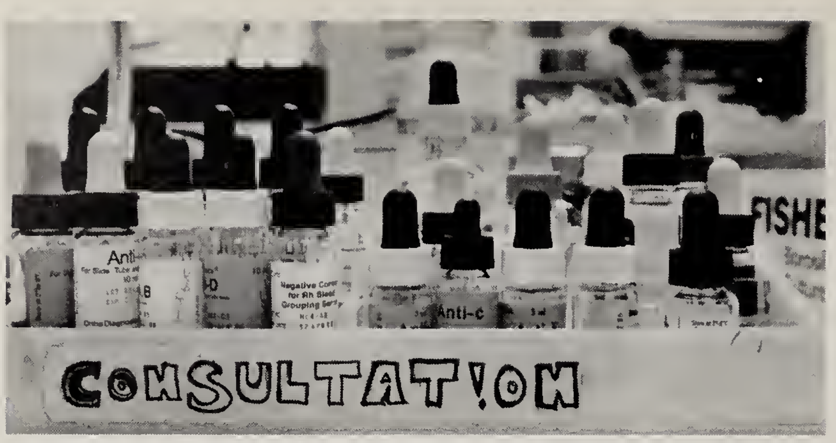
After a donor gives blood at the Blood Center, the blood is separated, typed according to Dr. Landsteiner's blood groups, and tested for biological safety. The processing includes tests for syphillis, hepatitis A, and cytomegalo virus. Blood is also tested for antibodies which might harm a recipient's red blood cells.

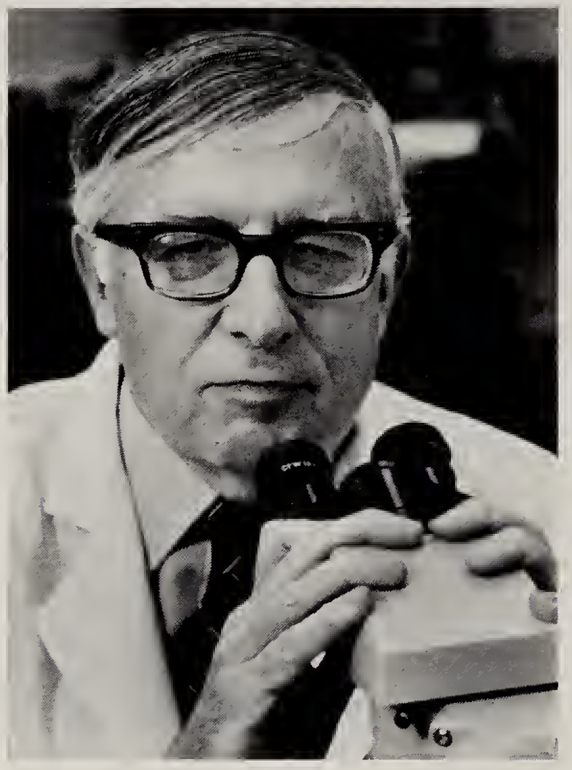
These stringent tests are designed to ensure biologically safe blood, but as a result of the AIDS situation there has been some public concern about the safety of the nation's blood supply.

"Blood in the general blood bank inventory is very safe," says Dr. Sassetti. "The probability of contracting AIDS from one blood transfusion is estimated to be about one in three million."

Because it's a well-recognized fact that the safest possible transfusion is a transfusion of one's own blood, the Medical Center established an autologous donor program about 15 years ago in which patients donate blood in anticipation of their own surgery. About 500 patients participate in the program every year. "If patients are concerned about the biological safety of blood, they can be enrolled in the autologous donor program if they are qualified candidates," says Dr. Sassetti.

Patients start the program three to four months before their surgery, and they donate a unit of blood every two weeks. In three months they have six units of blood stored, which is generally sufficient for all types of major surgery. The program is not recommended for cardiac patients and others who might endanger their health from the transfusion process.




William H. Knospe, M.D., directs the Medical Center's Section of Hematology.

New Treatment Methods

Today patient care utilizing blood includes many more sophisticated procedures and treatments than simple blood transfusions. In the last 20 years, through new technology, physicians have even developed a modern version of the ancient art of bloodletting. Called apheresis, the technique utilizes the technology that separates blood into elements, with the patient being attached by two veins to a blood separating machine. Blood goes out of one arm into the machine where it is processed into various components. One of these components is removed by the machine, and the rest go back into the other arm. If a large portion of red cells or plasma is removed, it will be replaced to ensure the patient maintains sufficient blood volume. The precise term for the procedure depends on the element being removed. Removing plasma, for example, is called plasmapheresis; leukocytes (white blood cells), leukopheresis; and platelets, plateletpheresis.

"Apheresis is usually used to remove injurious substances from the blood to reduce immediate, life-threatening risks," says William H. Knospe, M.D., professor, internal medicine, and director, Section of Hematology. "Then chemotherapy can be used to attack the source of the problem that is causing those risks."

Plasmapheresis, for example, can reduce the concentration of a substance in the plasma called immunoglobulin M (IGM) produced by malignant lymphocytes. IGM can cause heart failure, vision problems, and bleeding, so plasmapheresis is an important initial step in treatment before chemotherapy can be used to act against the abnormal, malignant lymphocytes.

Hemophiliacs, who have difficulty forming blood clots, have benefitted from both the technology that separates blood into components and apheresis technology. Hemophiliacs genetically lack one of the 13 factors in plasma that helps a clot to form, namely factor VIII. In the 1950s they were treated with plasma transfusions, and there were problems with cardiovascular overload. Today, they receive transfusions of just factor VIII. But Bruce McLeod, M.D., associate professor, internal medicine, has been using apheresis technology to improve conventional treatment methods still more.

"Hemophiliacs require an enormous number of factor VIII transfusions," says Dr. McLeod. "The problem with conventional treatment is that they have to receive factor VIII from so many different donors. Depending on the severity of the hemophilia, this can range from a few donors to many thousands of different donors in just one year."

The statistics of receiving blood are such that the more blood donors patients are exposed to, the more likely they are to encounter someone transmitting hepatitis or AIDS. Although blood is tested for hepatitis B, and, in the last few months, there have been reports of a blood test that may identify people at risk of transmitting AIDS, there currently is no screening test for other forms of hepatitis and the AIDS test is not ready for general use yet. Hemophiliacs, therefore, are in the high risk group for these diseases; their chances of getting AIDS are estimated to be about one in 100.

"An obvious solution," says Dr. McLeod, "is to limit the number of donors to which a blood recipient is exposed, and we go to great pains to do this."

Dr. McLeod has developed a technique to do this for hemophiliacs by using apheresis to harvest more factor VIII from a single donor than previously was possible. "Instead of taking a pint of blood and getting 100 units of factor VIII," he says, "with this new type of apheresis donation we can extract as much as 1,500 to 1,800 units in a single donation."

The technique involves removing plasma. Factor VIII is separated from the donor's plasma, and the balance is stored until the next visit. At the next donation more fresh plasma is extracted, and the donor is given back the balance of his/her plasma from the previous donation. The cycle continues in this fashion.

A factor VIII donation takes a little longer than a regular donation, two to three hours instead of 45 minutes. But instead of losing a

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Henri Frischer, M.D., Ph.D.

whole pint of blood, donors only lose factor VIII. Because of this, it's possible for them to donate more often. Whereas a blood donor must wait eight weeks between donations, a factor VIII donor can donate every week.

"So not only does this method increase the yield from a single donation," says Dr. McLeod, "it can increase the frequency of donations. In eight weeks one donor can give us 12,000 to 13,000 units of Factor VIII instead of 100."

Dr. McLeod has been using this technique for about five years, but says it hasn't been done on a large enough scale to be sure that the incidence of hepatitis and AIDS in hemophiliacs has gone down. "We have focused primarily on whether or not this kind of donation is safe for donors because it's quite different from anything that's been done before," he says. "So far, none of the donors has had any difficulty.

"We have one donor who has done this every week for a year now," says Dr. McLeod. "This man has a 12-year-old son who's a severe hemophiliac. This boy would normally have received blood from several thousand donors, but his father has provided all the factor VIII that the son has needed for a year. That's the best you can do."

The Coagulation System

Despite problems caused by the body's inability to form blood clots, the coagulation system is somewhat of a double-edged sword. Blood clots contribute to heart attacks when they form in an artery feeding the heart muscle and strokes when they form in a vessel feeding the brain. According to some estimates, 85 to 90 percent of the more than one million annual heart attacks in this country involve blood clots.

"The coagulation system is doing its job more actively than it should when it leads to heart attacks or strokes," says Edmond R. Cole, Ph.D., professor, biochemistry, and assistant professor, internal medicine. "The balance between two substances in blood, Thromboxane and Prostacyclin, should ensure that blood clots only at appropriate times."

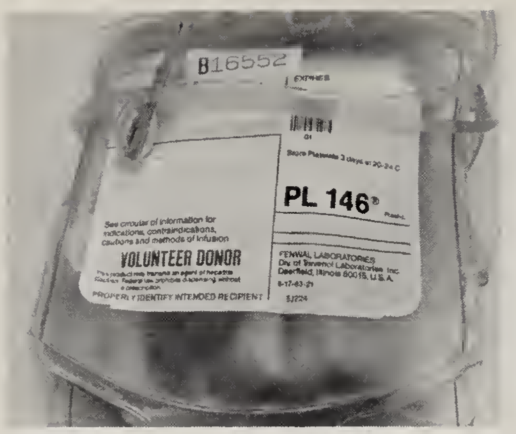
Thromboxane is found in platelets and its job is to help platelets clump together. Prostacyclin is found in the endothelial cells that line the blood vessel walls. It dilates the blood vessels and inhibits clumping.

The balance between these two substances can be upset by several factors, particularly atherosclerotic plaque which interferes with the production of Prostacyclin in blood vessel walls. Medications can also effect the delicate balance between coagulation inhibitors and promoters. Birth control pills can increase clotting, aspirin can inhibit it.

Dr. Cole has been working on a test to identify people at risk of developing blood clots. In addition to Prostacyclin, the endothelial cells also release and synthesize a substance called plasminogen activator. Like Prostacyclin, it inhibits clotting.

"It's probable that each one of us develops small clots in our body all the time," Dr. Cole says. "But plasminogen activator acts as a nat-

Bruce McLeod, M.D., uses apheresis technology to limit number of individual blood donors for hemophiliacs.



ural clot dissolution system, which immediately breaks down those blood clots so that they never become clinically apparent."

Because people with insufficient amounts of this enzyme have been found to have an increased risk of potentially damaging blood clots, Dr. Cole's test involves measuring plasminogen activator.

"By measuring this enzyme, we've been able to correctly identify people with a history of clotting problems," he says. "The test is one more tool to try and prevent cardiovascular problems due to blood clots."

Blood Disorders Screening

Analyzing blood is a necessary part of modern medicine, critically important in the diagnostic process for almost all medical problems.

"Blood tests play an important role in making accurate diagnoses because abnormalities in the blood are so common in most serious illnesses and clues from the blood are so significant," says Henri Frischer, M.D., Ph.D., professor, pharmacology and internal medicine, and director of the Medical Center's hematology laboratories and of the Section of Blood Genetics, Department of Pharmacology.

Modern blood tests include such sophisticated procedures as defining the components of blood clot formation; measuring the electrical charge of hemoglobins; testing blood cells' resistance to breakage; measuring the speed of enzyme reactions; and analyzing the cell's genetic material. But the most common blood test is the complete blood count.

There is practically no patient admitted to a hospital today who doesn't have a complete blood count. The most common abnormalities are those of the red and white cell count, which alert physicians to conditions such as infection or anemia. Under Dr. Frischer's direction, the Medical Center's clinical hematology laboratory is responsible for obtaining several hundred red cell, white cell, and platelet counts every day for inpatients and outpatients, and for identifying any abnormal cells that may be present. This lab is one of several Medical Center laboratory units devoted to the analysis of blood.

The coagulation unit, under Dr. Cole's direction, is primarily concerned with identifying abnormalities of the clotting properties in plasma. It also monitors the blood of patients on anticoagulant medications.

Blood is produced in the marrow of bones, and tests in the bone marrow laboratory can determine if, for example, some cells in this organ occur in abnormal numbers or whether leukemia is present. Chemical tests can also help determine what type of leukemia is present. Solomon S. Adler, M.D., associate professor, internal medicine, directs this unit.

Under the direction of Rajalaxmi McKenna, M.D., associate professor, internal medicine and pharmacology, the platelet function/radiohematology laboratory unit is concerned with platelet abnormalities, both the disorders that cause hemorrhaging due to an insufficient number of platelets and those that cause blood vessel blockage due to too many. There are also tests for platelet disorders due to decreased platelet functioning even when the count is normal and for disorders that make it necessary to measure the volume of circulating blood.

The special hematology laboratory, directed by Dr. Frischer, focuses on disorders of the hemoglobins, such as sickle cell anemia orthalessemias, as well as abnormalities of red cell membranes.

Blood disorders can also be caused by genetic enzyme abnormalities that lead to disturbances in the biochemical machinery of cells. These conditions range from those that occur in many millions of people in the world to those that have been observed in only a handful of families. The investigation of these disorders, which may require analyzing the patient's genetic history and examining family members, is handled by the Medical Center's Section of Blood Genetics and Pharmacogenetics.

The Medical Center's laboratories process a combined total of about a thousand blood tests per day. But Dr. Frischer cautioned that more than accurate laboratory work is required for precise diagnoses. "In addition to laboratory tests, a patient's medical history and physical examination are crucial for diagnosing a blood disorder," he says. "Good clinical skills lead to the best use of the laboratories because physicians can pinpoint which are the most necessary tests to order, perhaps bypassing tests that are often ordered automatically and maximizing the laboratory's contribution to patient care."

Bone Marrow Transplants

An accurate diagnosis, however, doesn't always mean successful treatment. The most serious blood disorders, leukemia, aplastic anemia, and severe combined immunodeficiency, are often fatal. They involve malfunctions in the production of blood in bone marrow. But in the last ten years, bone marrow transplants have been used successfully to cure victims of these diseases, and about 1,000

> *"Bone marrow is like a fine soil in which the seeds of blood production, called stem cells, are constantly proliferating."*
>
> **William Knospe, M.D.**

such transplants are now performed annually in the United States.

"Bone marrow is an extremely soft, delicate tissue," says Dr. Knospe, "that fills the hollow cavities of primarily the skull bones, vertebrae, ribs, and pelvic and pectoral girdles. It's like a fine soil in which the seeds of blood production, called stem cells, are constantly proliferating."

But in leukemia a large number of immature white cells, unable to fight infections, are produced. They crowd out healthy white and red blood cells so the leukemia patient often dies of infection. Sixty percent of children with acute lymphocytic leukemia and 25 percent of adults with acute leukemia may be cured with current chemotherapies. After a successful transplant, 30 to 60 percent of those not cured with conventional treatment will survive disease free.

Aplastic anemia results when the stem cells are damaged and can't reproduce. The marrow becomes a soil devoid of seeds, unable to make red cells, white cells, or platelets. Victims can die of infection or uncontrolled bleeding. Only 15 percent of aplastic anemia patients will survive without a bone marrow transplant, while a successful transplant raises the survival rate to 75 percent.

Severe combined immunodeficiency is a congenital defect, always fatal usually in the first year of life, because the stem cell responsible for producing specific white cells, called lymphocytes, is defective and the patient has no immune system to fight off infection.

Survival rates climb from zero to between 55 and 80 percent with a successful transplant. There is also early evidence that bone marrow transplants can help patients with a malignancy called non-Hodgkins lymphoma.

Last year the Medical Center opened a Bone Marrow Transplant Center under the direction of Herbert Kaizer, M.D., Ph.D., associate professor, immunology/microbiology and pediatrics, and director of the Section of Hematology/Oncology, Department of Pediatrics. The six-bed center has a staff of six attending physicians.

Because the education of future specialists is an important part of the bone marrow program, the staff also includes full-time residents from the Department of Medicine and a fellow from either the sections of hematology or oncology or the Department of Immunology.

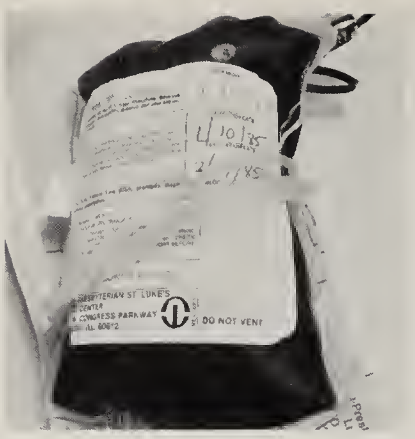
A key element of each patient's care is related to the research questions being asked by the center's staff. One area of research emphasized at the center involves projects designed to reduce post-transplant complications.

"Unlike other organ transplants where the donor and recipient are matched according to size and blood type, bone marrow transplants require the donor and host to possess matching genes located on a specific pair of chromosomes," says Dr. Kaizer.

"It's much more complicated than blood typing," adds Dr. Knospe. "When bone marrow transplantation was first tried in the 1950s we didn't understand about tissue matching, the method used to compare a donor's genes with the host's."

The result for most patients in those days was graft versus host (GVH) disease within three to six weeks of the transplant. Symptoms include skin rash, diarrhea, and liver abnormalities. Intensive

Herbert Kaizer, M.D., Ph.D., examines patient in Bone Marrow Transplant Center.



research over the last few decades has found that GVH disease is due to cells in a graft that were infused with the bone marrow, which identified the host tissue as foreign, proliferated, attacked the host's tissues, particularly the gut, liver, and skin.

"Scientists have spent the last 30 years trying to perfect tissue-typing," says Dr. Knospe, "and we've learned to identify tissue types and match for tissue differences which can reduce or prevent the effects of GVH disease. The problem is we haven't defined all the tissue factors, so even when we use tissue-typing techniques some degree of GVH disease still occurs in 50 to 60 percent or more of patients who receive a tissue-matched graft."

Because of the exact genetic match required for a successful transplant, a person's best chance of finding a suitable donor rests with an identical twin (as syngeneic graft), then with other brothers or sisters (an allogeneic graft). But because only 30 to 40 percent of patients have a sibling who's a matched donor, scientists have also been experimenting with extracting some of a patient's own bone marrow, treating it outside the body, then reimplanting it (an autologous graft).

Each method has advantages and drawbacks, but, surprisingly, GVH disease is both an advantage and a drawback of allogeneic grafts. "The immunological reaction that the graft has against the patient can be transferred to work against the patient's tumor cell," said Dr. Kaizer, "so a little bit of GVH disease is a good thing. Unfortunately, there is no way to regulate the amount of GVH disease, and the condition is fatal in more than half the severe cases."

In syngeneic grafts, the immunological problems of GVH disease are eliminated because the patient and donor have the same genetic structure. But at the same time, the patient gets no therapeutic effect from GVH disease.

"If you look at the results we've obtained in patients who, for example, are transplanted because of leukemia," Dr. Kaizer says, "you find that the percentage of patients that die from a relapse with leukemia is higher when you use an identical twin. But the percentage of patients dying because of GVH disease is higher when you do an allogeneic transplant. So the final result is that the percentage of patients that survive for long periods of time free of their leukemia is about the same in both groups."

Dr. Kaizer and his staff are currently studying several ways to reduce the complication rate from GVH disease. One way to do this is through the use of monoclonal antibodies to destroy the cells (called T-cells) that bring on GVH disease in an allogeneic graft. Monoclonal antibodies are made from fusing a particular type of cancer cell with a normal lymphocyte, which is what's capable of making specific antibodies. Studies at several institutions have shown that monoclonal antibodies can be made against mature T-cells and are very effective at destroying them in an allogeneic graft. This allows the patient's body to take command of the donor graft's immature T-cells, which can be instructed not to attack the patient's cells.

Another way to prevent mature T-cells in allogeneic grafts from attacking the patient's cells may be through the use of the drug cyclosporine. Although scientists don't know exactly how the drug works, it's believed cyclosporine prevents T-cells from recognizing the host as a foreign body. Rush-Presbyterian-St. Luke's is one of five medical centers in the country to receive FDA approval to test cyclosporine on patients undergoing bone marrow transplants.

"Ideally, we'd like to find a way to reduce the complication rate of GVH disease without concomitantly reducing the anti-tumor effect," says Dr. Kaizer, "but this may not be possible. It may be that as we reduce the amount of GVH effects, we get more patients relapsing just as they do when they get syngeneic or autologous transplants."

Autologous transplantation has the same advantages and disadvantages as identical twin transplants, but it has an additional disadvantage in that it's very likely that cancer cells will be hiding in the bone marrow of leukemia patients, even those who are in remission, and these cells can regrow once the bone marrow is transferred back into the patient.

"To make autologous transplants work we have to solve two problems," says Dr. Kaizer. "The first is to purge the cancer cells in bone marrow before we give it back to the patient. The second, which is not unique to autologous transplants, is to eliminate the tumor in the patient once the bone marrow has been removed."

Scientists in the Bone Marrow Transplant Center are looking for solutions to both of these problems through research. While not ready for clinical trials yet, several projects are underway to develop better methods of treating the patient before the bone marrow is returned. Rush Medical College students have been helping the center's staff in this area by study-

"Bone marrow transplants require the donor and host to prossess matching genes located on a specific pair of chromosomes."

Herbert Kaizer, M.D., Ph.D.

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ing transplantable tumors in animals to develop these methods.

Clinical tests are already underway for a solution to the first problem—eliminating cancer cells in removed bone marrow. Dr. Kaizer and his staff are making headway in this area by treating bone marrow in the test tube with a derivative of the drug cytoxan called 4HC. In the first phase of the study, completed while Dr. Kaizer was on staff at Johns Hopkins Medical Center, the researchers determined the maximum concentration of the drug to kill off as many tumor cells as possible without killing off too many normal cells in the bone marrow.

The second phase of the study is currently underway at Rush-Presbyterian-St. Luke's Medical Center and Johns Hopkins to determine the therapeutic effectiveness of treating bone marrow with this concentration of the drug. All participants in the study are at the same stage of their disease, second remission. Their bone marrow is treated with the drug, frozen, and stored. The patients then receive intensive therapy to kill their tumor cells, after which the treated bone marrow is returned to them.

"This was done with two groups of patients," says Dr. Kaizer, "one with acute lymphocytic leukemia (ALL) and one with acute myelocytic leukemia (AML). Only about ten percent of the phase I and phase II ALL patients are surviving disease-free, but about 40 percent of the AML patients are surviving without their leukemia," he said. "We need to follow more patients and look at them for a longer period of time, but so far the AML data is encouraging and suggests that the treatment with 4HC will work for many of these patients."

The drug 4HC may not be the only solution for potential bone marrow transplant patients who don't have a genetically-matched donor. Monoclonal antibodies may be another. Studies show they are also effective in destroying leukemic cells in an autologous graft.

Dr. Kaizer hopes that through the use of monoclonal antibodies, 4HC, and cyclosporine, the success rates for bone marrow transplants will rise. Success rates depend a lot on how severe a disease the recipient has, what stage it's in when the transplant is done, and how old the recipient is.

Once a patient is older than 30, the complications from GVH disease become more severe. The overall success rate for a patient over 30 with AML, transplanted in the first remission, is about 30 percent. According to Dr. Kaizer, that's not much better than a patient might do with the best forms of chemotherapy.

But autologous bone marrow transplants can be used safely in older patients. "One patient who has done very well is a 51-year-old man with non-Hodgkins lymphoma," says Dr. Kaizer. "He had a very aggressive tumor that grew all during his primary treatment. Because of that and because of his age, I was very concerned about this patient. But he recovered from the transplant very rapidly and was out of the hospital four and one-half weeks afterward."

Blood Defense Mechanisms

The immunological problems associated with transplants occur because of cells (primarily white cells) and proteins (antibodies and the complement system) in blood that react to foreign substances. Howard M. Gebel, Ph.D., assistant professor, Department of Immunology and director of the general immunology laboratory and the histocompatibility laboratory, tests the cellular elements of these blood defense mechanisms to determine whether bone marrow transplant patients and prospective donors are compatible.

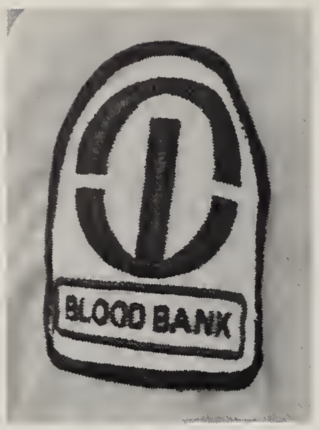
"There are two tests performed to determine who is the best donor for a bone marrow transplant patient," Dr. Gebel says. "These tests detect the major components involved in graft rejection."

The first test is serological; the second is cellular. The serological test determines if surface proteins (antigens) on white blood cells are identical in both donor and recipient. The cellular test determines this for surface proteins that have other characteristics and functions.

"Both tests measure white cell surface proteins," says Dr. Gebel, "but the serological test only takes about three hours. The cellular test identifies antigens not detectable as quickly. This test takes about a week because we mix cells from the patient and prospective donor and wait to see if any signs of incompatibility develop. The cellular test is basically an in vitro indication of potential GVH disease."

While these two tests are very accurate for determining compatibility between major surface proteins involved in graft rejection, there are other proteins that also can lead to graft rejection which can't be detected. "These proteins are minor in comparison and are less likely to lead to severe GVH disease," Dr. Gebel says. "However, if too many of these are mismatched, the degree of GVH disease could be as severe as if one of the major antigens isn't matched."

In addition to doing the initial



testing between patients and prospective donors, Dr. Gebel and his associates in the clinical immunology laboratory are also studying methods that could predict graft rejection in its earliest stages. These blood tests would allow physicians to treat their patients for GVH disease before the actual onset of symptoms.

While Dr. Gebel is studying the cellular elements of blood defense mechanisms, Henry Gewurz, M.D., the Thomas Coogan, Sr., Professor and chairman of the Department of Immunology, is studying the protein elements. Dr. Gewurz and his colleagues have been studying one protein in particular, called CRP (C-Reactive Protein).

CRP is the most conspicuous of the proteins that increase in blood during the acute phase of illnesses. It is always present in blood in very low levels, but during serious infections, such as bouts of rheumatoid diseases, surgery, trauma, and virtually any process associated with inflammation, CRP levels skyrocket.

CRP was discovered in the late 1920s, a time when the power of antibodies, the proteins involved in the best understood defense mechanisms of the body, had only recently been appreciated. "Antibodies were being used extensively both to diagnose and treat infections," says Dr. Gewurz, "and CRP was discovered as a substance that mimicked a few of the properties of antibodies."

Initially, CRP was also used diagnostically. Its presence confirmed that a person was ill and could determine the effectiveness of treatment. "If therapy was working, the level of CRP in blood went down," Dr. Gewurz says.

There was one big difference between CRP and antibodies, however. While specific antibodies appear in blood in response to specific illnesses, CRP appears in response to many illnesses.

"So while its presence indicated inflammation, it didn't tell you what specific condition the patient had," says Dr. Gewurz. "Its use as a diagnostic tool was therefore limited, and, today, it's used largely as a laboratory aid to establish the presence of acute inflammation and tissue death."

Dr. Gewurz and his associates are studying CRP to determine its biological role. "We want to know what it is, what it does, and how it can be used to further clinical diagnoses and new approaches to therapy," he says.

One of their most striking findings is another similarity between CRP and antibodies. Like antibodies, CRP identifies foreign substances and damaged tissue and activates blood enzymes to digest both.

"This process is like the removal of diseased trees by the city street department," says Dr. Gewurz. "One group recognizes and marks the appropriate trees for destruction by painting an 'X' on them. Another group then removes the trees that have been identified. CRP is the identifyer."

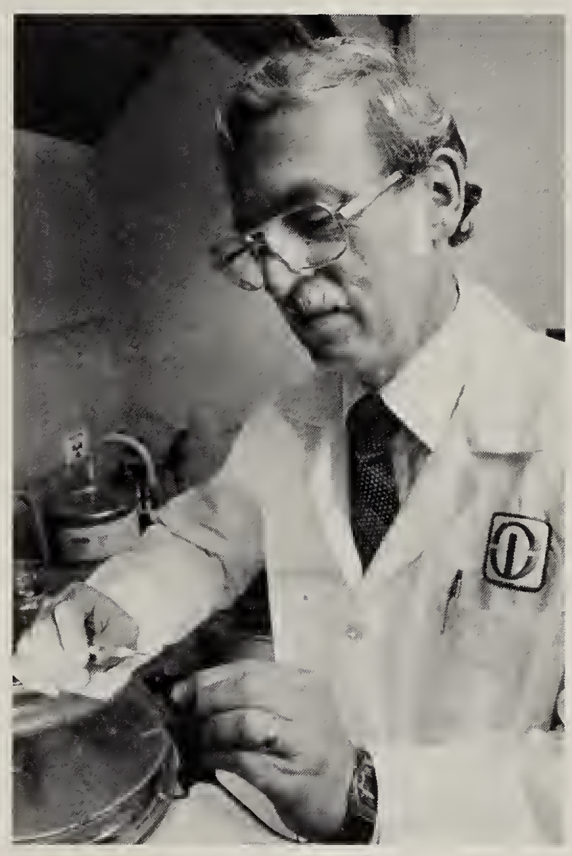
Studies at the Medical Center in this area have also shown that CRP can protect against bacterial infections in experimental animals. "So CRP seems to have a key role in the body's response to injury," says Dr. Gewurz. "We want to know exactly what that role is."

Natural Red Blood Cells

While diseases that interfere with the body's defense mechanisms are the most life-threatening blood disorders, fortunately they are not common. The most common blood disorders, anemias, are abnormalities in the production of red blood

The research of Henry Gewurz, M.D., concerns protein elements of blood defense mechanisms.

> *"Synthetic erythrocytes meet the primary requirements of a red blood cell. They pick up, carry and release oxygen and carbon dioxide like a natural cell."*
>
> **Ljubomir Djordjevich, Ph.D.**



Walter Fried, M.D., tests erythropoietin levels in mice.

cells. Walter Fried, M.D., professor, internal medicine, has been studying the production of these cells—and the secretion of a hormone called erythropoietin that triggers the production process.

"When people go up on top of a mountain where there's a decreased amount of oxygen in the air," says Dr. Fried, "they need more red blood cells to deliver oxygen to their tissues. So this hormone, erythropoietin, is secreted and it triggers an increase in the production of red blood cells in the bone marrow. The process is the same if a person develops anemia: erythropoietin is secreted to try to stimulate red cell production to make up for the shortage."

Dr. Fried has been studying the way erythropoietin regulates the production of red blood cells since he was a medical student. The first studies he worked on confirmed the existence of the hormone as the initiator of red cell production and also showed where it's produced—the kidneys. "Normally production of the hormone is stimulated by a decrease in the amount of oxygen delivered to the kidneys, and this explains why many people who suffer from kidney failure and who therefore can't secrete erythropoietin develop anemia," he says.

Administering erythropoietin to treat these patients may be one payoff from this early research. The key to developing such treatment is to produce erythropoietin in large enough amounts and in pure enough form to test clinically. In collaboration with scientists, members of the pharmaceutical industry have recently been able to purify the hormone, clone the gene for it, and insert the gene into cells that produce erythropoietin. Dr. Fried thinks they should be able to produce enough erythropoietin to start clinical trials soon.

Dr. Fried hopes another result of the discovery of erythropoietin will be the development of sensitive tests to help diagnose the causes of certain types of anemias. Some anemias are characterized by higher levels of erythropoietin than others, and a test that pinpoints the exact amount can direct a physician to the correct diagnosis.

More recently, Dr. Fried's research has involved tracking down the kidney's back-up system for erythropoietin production. "When we showed that the kidneys are the major source of erythropoietin production," says Dr. Fried, "there was already evidence that even if you take out the kidneys there is still a small amount of the hormone in the body. The kidneys produce about 90 percent, but ten percent was coming from somewhere else."

Dr. Fried now believes that "somewhere else" is the liver. "Our studies show that in fetal life the hormone is produced by the liver, and then, about four weeks after birth, the production site shifts to the kidneys and the liver becomes dormant. We've seen patients who have had both kidneys removed who did not stop making red blood cells altogether. They made very little, but their bodies made enough to keep them alive. A number of patients without functioning kidney or even without kidneys at all are now being sustained for many years on dialysis. So now the question is, 'if the liver can make erythropoietin, is there some way it can be stimulated to make more so that the livers of patients with chronic renal disease could make it?'"

To find a treatment for kidney patients by this route, Dr. Fried has been collaborating with Colin Morley, Ph.D., associate professor, biochemistry, to determine what cells in both the liver and kidney are responsible for erythropoietin production.

Dr. Fried is also studying a number of other factors that relate to erythropoietin production, including the feedback mechanism that shuts off production of the hormone. "Unless we understand all the facets of the regulatory process," says Dr. Fried, "we can't really understand what it means not to be regulated. Maybe there are certain conditions where the feedback system doesn't work and that's why some people have too many red blood cells. Or maybe it works too well sometimes and that's why some people are anemic. The more we look at issues like these, the more we generally find that, three or four years later, we come to

understand the mechanism in certain anemias that couldn't be explained before."

Artificial Red Blood Cells

Another possible solution for patients who suffer from damaged or insufficient red blood cells is synthetic red blood cells, or synthetic erythrocytes (SE). These are currently being developed by researchers in the Medical Center's Department of Anesthesiology with support from the National Institutes of Health and private industry.

Under the direction of principal investigator Anthony D. Ivankovich, M.D., professor and chairman, anesthesiology, and Ljubomir Djordjevich, Ph.D., senior scientist, and one of the inventors of synthetic erythrocytes, a team of researchers has produced this red blood cell substitute, which acts just like the real thing.

"Synthetic erythrocytes meet the primary requirements of a red blood cell," said Dr. Djordjevich. "They pick up, carry, and release oxygen and carbon dioxide like a natural cell. We have done many blood exchanges in progressively larger animals, and the SEs function as carbon dioxide and oxygen carriers."

"Dr. Djordjevich makes synthetic erythrocytes by taking hemoglobin, either from animal blood or from outdated human blood supplies, and wrapping it in a synthetic membrane solution of fatty substances, lecithin and cholesterol. By mixing the ingredients in a blender-like machine, the membrane solution comes in contact with the water in the hemoglobin and spontaneous encapsulation takes place.

The resulting bright red fluid not only does the job of natural red blood cells, it also solves many of the problems physicians have with transfusing natural blood. "SEs will have a longer shelf-life than natural blood," says Dr. Djordjevich. "We think they could last as long as six months."

And because Dr. Djordjevich leaves out the protein tags in the cell membrane that make blood-typing and cross-matching necessary in transfusions, SEs are universal donors. They could be transfused into any human, or even any animal, without causing a reaction, saving precious time in an emergency. The membrane also makes the cell stronger than a natural cell, so SEs are better able to pass through blood pumps used during open heart surgery.

SEs have another important advantage. They are small, spheroid-shaped cells instead of the larger, donut-shaped structures of natural red blood cells. "They are 50 times smaller than natural cells," says Dr. Ivankovich, "so we think they should be more able to pass through partially-obstructed blood vessels, such as those narrowed by atherosclerosis."

But the potential for large-scale production of blood may be the most important reason for the development of synthetic erythrocytes. In the event of a natural catastrophe or a war, when blood is needed the most but conditions for replenishing supplies and proper storage are the worst, the ability to produce synthetic blood could save many lives.

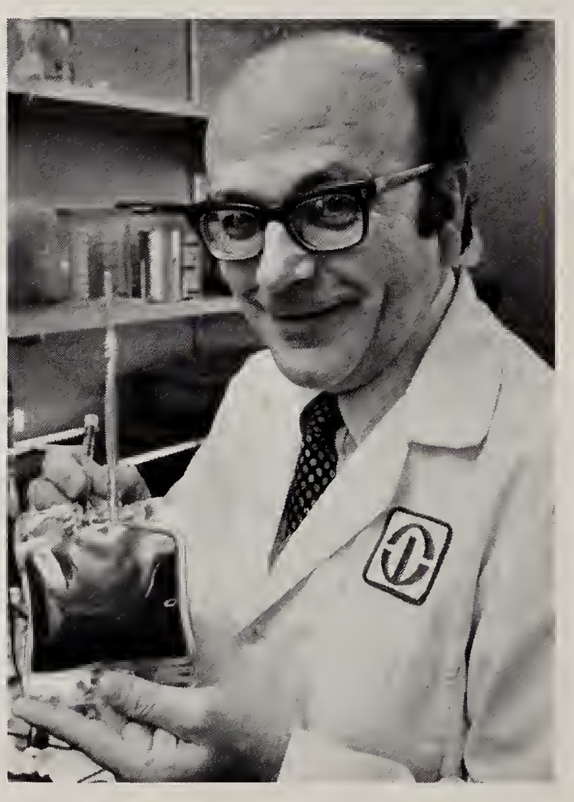
But synthetic erythrocytes also have a few problems. First, they are very expensive to produce. Second, it is very difficult to guarantee sterility at each of the several stages of production.

"These problems are linked together," says Dr. Djordjevich. "The product is expensive because of the difficulty in maintaining sterility. It's really the only reason for the high cost. The membrane components are inexpensive and you can recycle outdated human blood or use animal blood for the hemoglobin."

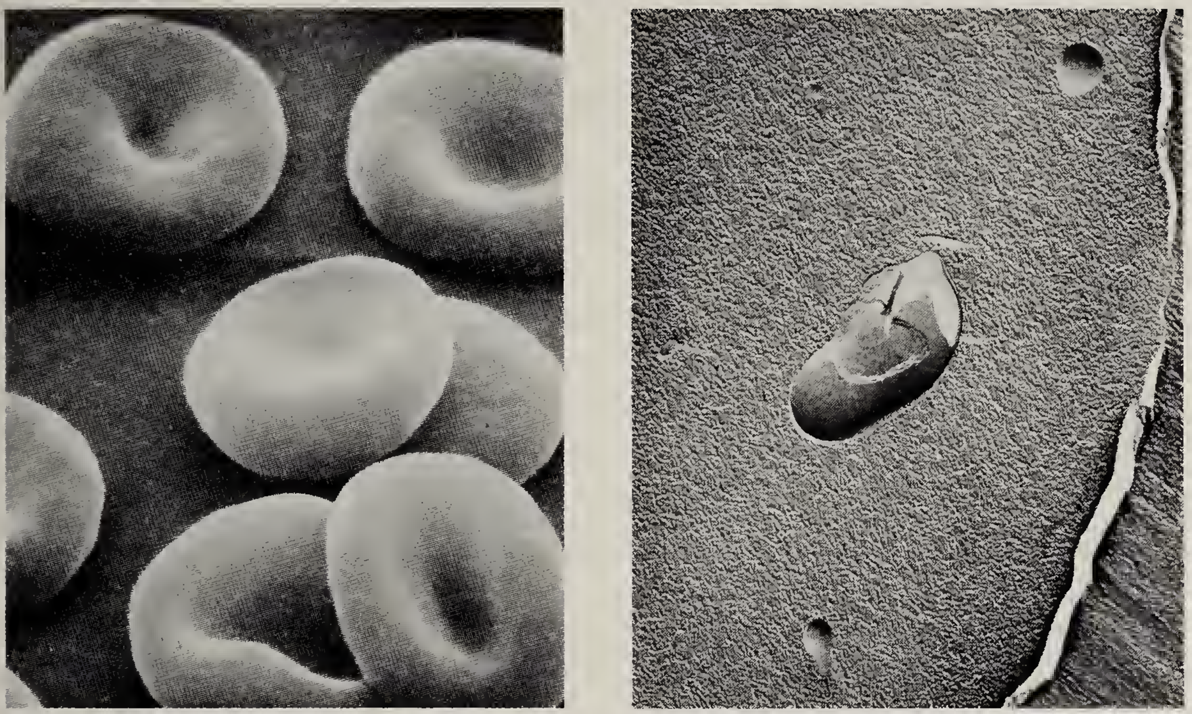
It's the equipment that's needed to sterilize the SEs during production that's costly, and the technology available today is not ideal for the job.

"So the next progress to be made in this area is in the equipment," says Dr. Ivankovich. "Manufacturers are working with us to develop this technology, so the next step is really in their hands."

Even with the current technology, though, SEs also offer the hope of eliminating the problem of disease transmission by transfusions. "There's a good possibility that the hemoglobin could be



Ljubomir Djordjevich, Ph.D., displays bag of artificial red blood cells, which he helped develop.



Electron micrographs of: (from left) doughnut shaped natural red blood cells, and spheroid shaped artificial red blood cells (developed by Dr. Djordjevich).

sterilized to eliminate viruses such as hepatitis and AIDS before it's encapsulated," says Dr. Ivankovich. "With a natural red blood cell, the hemoglobin is already encapsulated so this kind of sterilization isn't possible."

Drs. Ivankovich and Djordjevich believe the synthetic erythrocytes should be available for general use within the next ten years. Are artificial white blood cells, platelets and plasma also on the horizon?

"Blood is an enormously complex fluid with a multitude of functions," said Dr. Djordjevich. "We have concentrated on providing the carrier function of red blood cells, which is the component most often needed for transfusions. Whether or not true artificial blood containing all the blood elements and providing all those functions could be produced someday, we just don't know."

But considering the fact that it took more than 500 years to perfect the simple blood transfusion and in just the last 75 physicians have learned to do amazing things such as preserve blood, withdraw only minute components of it, analyze blood to prevent diseases and decide diagnoses, circumvent malfunctions in the production of blood, begin to understand the body's defense mechanisms in blood, discover the steps in red cell production, and develop artificial red blood cells, it's not hard to believe that someday scientists could develop a completely artificial version of this complex, most remarkable fluid.

GLOSSARY

Red blood cells	carry the protein hemoglobin which delivers oxygen from lungs to cells, carbon dioxide from cells to lungs and gives blood its red color.
White blood cells	fight bacterial and infectious diseases.
Platelets	first blood component to start clotting process. They clump together and help plug holes in damaged blood vessels.
Plasma	liquid that makes up 55 percent of blood. Contains the complement system which aids white blood cells in defense function; 13 clotting factors which help platelets in coagulation; and the protein albumin which carries hormones from site of manufacture to tissues.
Vessels	channels for carrying a fluid.
Arteries	vessels through which blood passes away from the heart to various parts of the body.
Veins	vessels through which blood passes from various parts of the body back to the heart.
Capillaries	minute vessels that connect arteries and veins.
Bone marrow	where blood is produced. Soft organic material that fills bone cavities.
Factor VIII	antihemophilia factor (AHF). Deficiency of this factor, when transmitted as a sex-linked recessive trait, causes hemophilia.

Organ Procurement: Providing A Chance for Life

By Mary Ann Redeker

Transplants get the headlines, but behind the scenes are the organ procurement teams whose 24-hour work schedules help make these headlines possible.

It's two o'clock in the morning when Rush-Presbyterian-St. Luke's Medical Center's organ procurement coordinator, Mindy Malecki, is awakened by her beeper. One of the hospitals in the Medical Center's 39-hospital organ procurement network has a potential organ donor—an 18-year-old victim of a serious auto accident.

Nurses at the hospital inform Malecki that the patient has been declared "brain dead" by one of their neurosurgeons and that the victim's family is interested in donating his organs. Malecki begins organ donation arrangements.

Many things will happen in the next 24 hours: permission for donations will be obtained and suitable recipients found via a computer network; an organ procurement/transplant team from The University of Virginia Hospitals will fly in, remove the donor's heart, and return to Virginia to transplant it. The donor's bone will be processed and put in the bone bank at the Medical Center and the kidneys will be on their way—one to a recipient in Chicago, the other to Salt Lake City, Utah.

Evolution of a System

Forty years ago, none of these "miracles" could have happened. Human organ transplantation is first mentioned in ancient Egyptian manuscripts, but it wasn't until the early 1900s that the first successful direct blood transfusion between two people was completed. Transplantation advances continued slowly, with the first successful corneal transplant occurring in 1905 and a kidney transplant between identical twins in 1954. With advances in medical technology and scientific research, transplant "firsts" continued more quickly into the 1960s: bone marrow, liver and lung transplants in 1963, pancreas transplants in 1966 and heart transplants in 1967.

Only recently has organ procurement and transplantation been heralded as a modern "miracle." First attempts at transplantation were fraught with disappointment. Most patients only lived a few days or weeks at the most. Their bodies rejected the new organs or the newly discovered anti-rejection drugs suppressed their immune systems causing unrelated diseases or infections to set in. Organ procurement and preservation were difficult because there was no systematic way to distribute cadaver organs and preservation techniques were rudimentary.

These first attempts, and failures, led to more money for research, more sophisticated medical equipment and better surgical techniques. Transplant surgeons can now successfully transplant hearts, lungs, livers, kidneys, bone and bone marrow, pancreata, skin, inner ear bones and corneas.

The discovery in 1980 of cyclosporine, an anti-rejection drug derived from a fungus found in a Norwegian soil sample, has markedly increased the transplant survival rate. With this drug, recipients can now anticipate at least a five-year survival rate and, in the case of many organ recipients, life-long good health.

Procurement and preservation have also improved: A cadaver heart can now be preserved for five to six hours, a liver for six to eight hours, a kidney up to 72 hours and corneas for two to three days. Bone is frozen and can be preserved for years.

The current organ procurement

system enables donor cadaver organs to be matched with and transported to the recipient quickly and efficiently. The United Network for Organ Sharing (UNOS) and the North American Transplant Coordinators Organization (NATCO) 24-ALERT computerized system for distributing organs has been implemented; organ procurement centers (like the one at Rush-Presbyterian-St. Luke's Medical Center) have been created to obtain organs through regional hospital networks; and an increase in awareness of the need for organ donors in the medical community and the general public has slowly increased the number of organs available for transplant.

The Team Effort

It begins with tragedy... a 17-year-old boy seriously injured in a car accident... a ten-year-old drowning victim... a shooting death... and finally only the steady beep of a cardiac monitor and a life sustained artificially.

It is at this point that the "miracle" of organ procurement/transplantation begins.

But, before the working organ procurement team can approach the victim's family with the possibility of organ donation, the victim must first be declared brain dead by a physician, usually a neurologist or neurosurgeon. "Brain death is hard to accept when a respirator is providing the illusion of life," says Amy S. Peele, R.N., director of the Organ and Tissue Recovery Program at Rush-Presbyterian-St. Luke's Medical Center. "For a long time, a person was considered dead with the cessation of the heart. Now people can be kept alive artificially."

Today, brain death is considered legal death in many states, including Illinois. Although there are no legal guidelines for determining brain death, physicians follow one of two sets of criteria (established by the Harvard School of Medicine and the American Medical Association). Clinical signs of brain death include no spontaneous breathing, no response to painful stimulation. A flat electroencephalogram or EEG (a test which measures brain electrical activity), or a cerebral blood flow are two types of exams that some physicians use as guidelines in their diagnosis, though they are not required.

One of the biggest misconceptions is that brain death is synonymous with coma, a condition in which there is still a measurable blood flow to the brain and some resulting brain function, providing a chance for recovery. With brain death there is no flow of blood to the brain, therefore no chance of recovery. "Families of patients who are clinically brain dead think their loved one is in a coma and will one day awaken," Peele says. "This simply won't happen; no patient who has been declared brain dead has ever recovered."

Approaching the family of a potential donor must be handled with sensitivity. "The tragedy happens so fast," Peele says, "that the family has no time to adjust to the fact that one minute their loved one was fine—walking to school with friends, driving to work, or playing in the backyard—and the next minute, he or she is lying in a hospital bed, dependent on a respirator."

Both Peele and organ procurement coordinator Mindy Malecki feel very strongly about the fam-

Members of the Organ and Tissue Recovery Program: (clockwise) Stephen C. Jensik, M.D., Ph.D., medical director; Mindy Malecki, organ procurement coordinator; Amy Peele, R.N., director, and Jeffrey Meincke, preservationist.

ily's right to know their options. "If a woman has breast cancer, she is usually offered treatment options," Malecki explains. "If a family member is declared brain dead, families should also be offered all the possibilities—not just turning the respirator off or leaving it on. Families should be given the chance to take something positive from a tragic situation."

Peele, Malecki and transplant surgeon Stephen C. Jensik, M.D., Ph.D., assistant professor, general surgery, and medical director of the Medical Center's Organ and Tissue Recovery Program, discuss these issues at in-service programs for physicians and nurses at the 39 hospitals which are part of the Medical Center's organ procurement network. "It is these physicians and nurses who usually approach the family first," Malecki says. "It's important that they understand the procurement process so they can answer any questions the family may have. We also hold discussions on how to approach families and tactfully explain the options to them."

Malecki also points out that if the staff feels uncomfortable about approaching a certain family, and they often do, one of the team is available to talk to that family. They also help staff members deal with their own levels of discomfort about organ donations.

"These are very difficult decisions for the family to make, especially in time of crisis. It's sometimes hard for them to see organ donation in terms of a new heart for a 48-year-old man or a liver for a six-year-old girl," Peele says. "That's why the family is never pressured and we make every effort to have physicians, nurses or chaplains available to them."

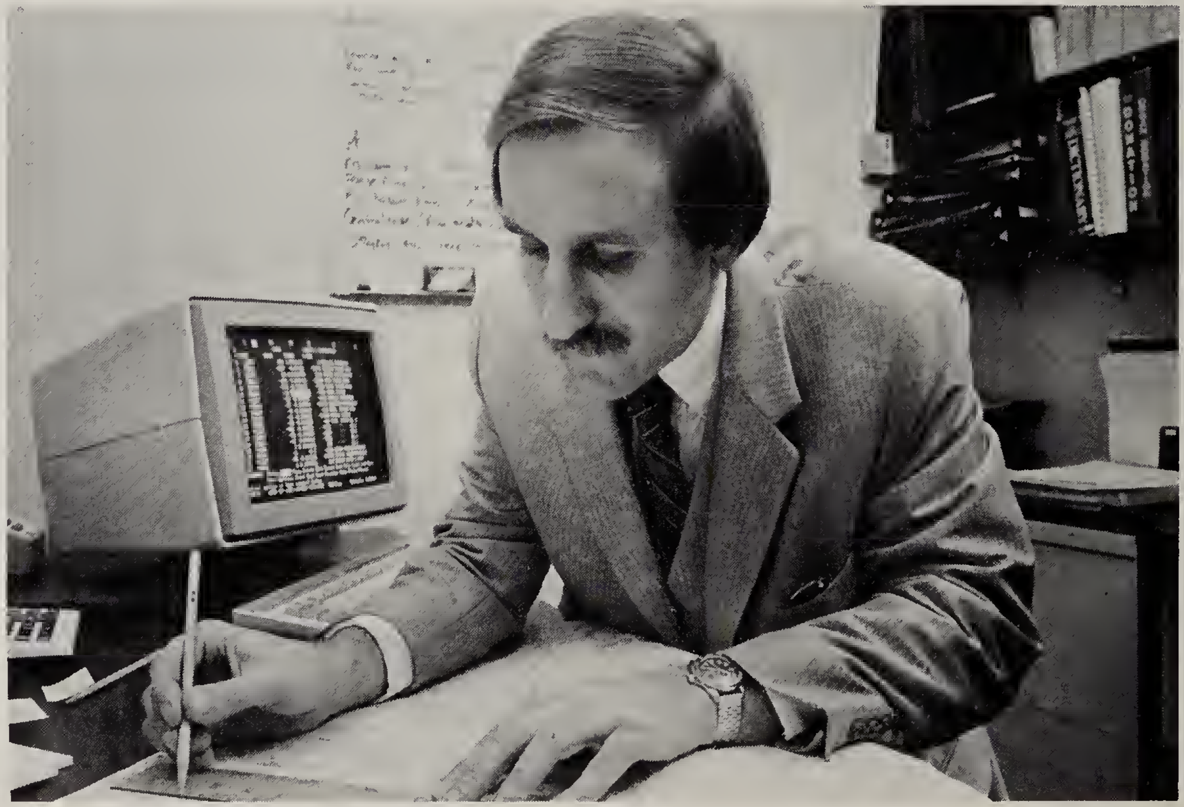
Families are usually going through a grieving process and want someone to talk to. The organ procurement team is working with the Medical Center's Department of Religion and Health to establish protocols for helping such families.

Reverend James Corrigan, clinical coordinator of pastoral services at Rush-Presbyterian-St. Luke's Medical Center, describes the role of the chaplain as counselor to help family members clarify their feelings and the issues involved so they can make the decision which is best for them. "There are two processes going on at the same time," he says. "One is the family's need to grieve, the other, the life-giving role of organ donation. In some cases, organ donation may be a clear asset to the grieving process; in other cases, it could be complicated or even detrimental. Many families need help in making this determination."

Informed, voluntary signed consent from the deceased's next-of-kin is necessary before organ procurement arrangements can be made. The Uniform Anatomical Gift Act of 1975 recognizes "the legality of donor cards and living wills, as well as the right of families to make donations for relatives who have never indicated a willingness to serve as an organ donor."

Once the organs to be donated have been designated and a signed consent received, Peele and Malecki begin an evaluation of the potential donor, under the supervision of Dr. Jensik. Malecki works from a form she herself devised.

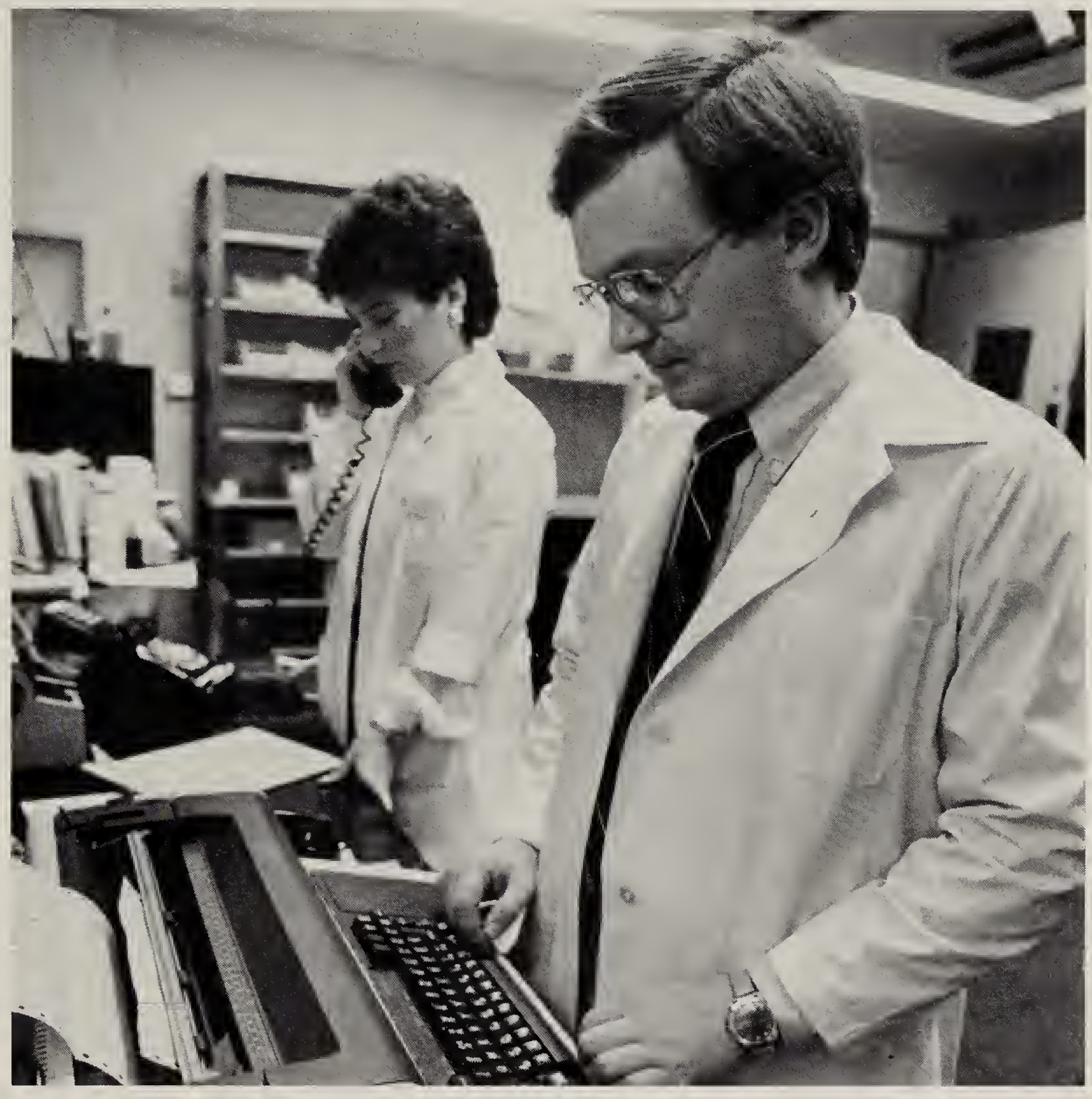
"I take into consideration the donor's past medical history. The presence of cancer, diabetes, hepatitis, hypertension and infection could make donation impossible," she says. "I also evaluate the extent of the injuries to see if organ donation is even possible." For exam-



Paul Volek, M.P.H., administrator of the Organ and Tissue Recovery Program, works with a referral network of hospitals extending into three states.

"Families should be given the chance to take something positive from a tragic situation."

Mindy Malecki



Mindy Malecki calls in donor information to NATCO 24-hour ALERT system while Jeffrey Meincke plugs same information into UNOS.

ple, a severe chest or abdominal injury could preclude the removal of the heart, lungs, pancreas and kidneys. A head wound could affect cornea donation.

Age is also a consideration. Donors must be under 65 years old to be considered for kidney donation, between 10 and 65 for bone, under 45 for heart, between six months and 55 years for liver and pancreas, and between 12 and 60 years for skin.

Depending on which organs are to be donated,laboratory tests are run to determine the donor's tissue type, kidney function and cardiac and/or liver function.

Once all the pertinent medical information has been assembled, appropriate contacts are made. The resources to identify potential organ recipients include the North American Transplant Coordinators Organization (NATCO) 24-ALERT, a computer system accessible by telephone which provides the caller with a priority listing of urgently needed extra-renal organs, such as livers, hearts, heart/lung combinations and pancreata from 110 transplant centers across the United States and Canada. Kidneys are placed through a separate nationwide computerized system, United Network for Organ Sharing (UNOS); corneas and bones are preserved in Illinois and are placed through systems sponsored by the Illinois Eye Bank and the Bone Bank of Rush-Presbyterian-St. Luke's Medical Center.

When information is fed into the NATCO 24-ALERT computer the synthesized voice asks for: the region to be searched (because of the short preservation times of some organs, travel from a west coast hospital to an east coast hospital would be impossible); organs available; and the donor's blood type, weight in pounds, age, and sex. The computer then begins the search, listing all the transplant centers in the specified region that need specific organs.

The centers are listed according to need. Status I indicates that the potential recipient is in the hospital in critical condition; Status II, that the recipient is in the hospital but in stable condition; and Status III, that the recipient is at home awaiting an organ transplant. A new status—extremely urgent—has recently been added to let coordinators know that a patient's condition has worsened to the point that he or she has only hours to live.

In some cases, potential recipients have become so highly sensitized that close tissue compatibility becomes a factor in the success of a transplant. The transplant center then requires a crossmatch. "Serum from the recipient is flown to the donor hospital," Peele explains, "and, together with serum from the donor, is sent to the laboratory for testing." If there is no reaction between the donor's and recipient's serum, there is a likelihood that the donor organ will be compatible; if there is a reaction, compatibility is in question.

A crossmatch can delay the process anywhere from four to six hours, so before calling these centers, Peele and Malecki make sure that the donor is stable.

"Artificial support systems (respirators) do not guarantee that the potential donor is in stable condition," Malecki points out. "In fact, the longer a person is on a respirator, the greater the chance for complications. By the time the crossmatch has been completed, a donor's condition can worsen considerably.

"We call transplant centers in the extremely urgent and Status I categories first," Malecki explains. "I have made anywhere from one to twelve calls trying to place an organ."

And herein lies one of the problems of the current organ procurement system. The transplant center may desperately need the organ for a patient, but their transplant team may not be available to come for it. They may be out procuring an organ already or they may be exhausted, having been up for many hours working on another procurement/transplant case. "It's sometimes very frustrating!" Malecki says.

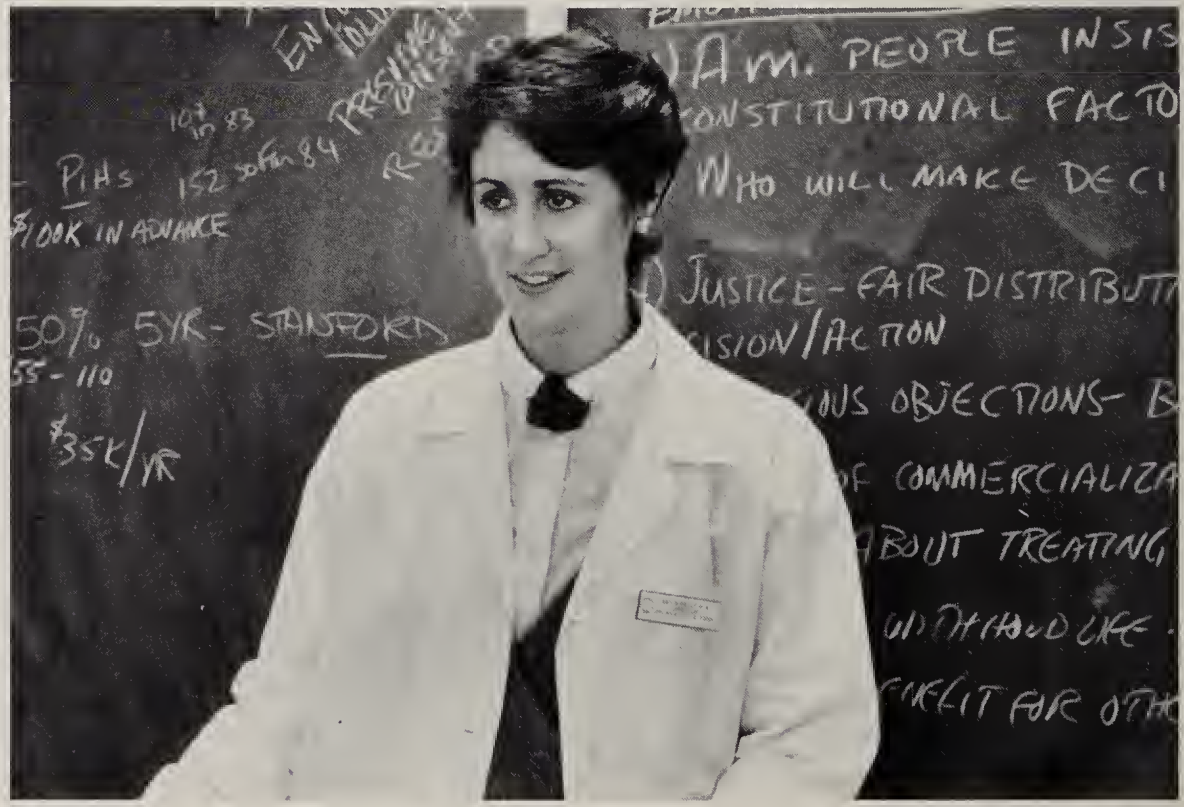
Because kidney, cornea, skin and bone preservation times are longer than that for a heart, placement of these organs is less of a problem. Donor kidneys can be put on a preservation machine and brought back to the Medical Center to be tissue-typed at the University of Illinois' central laboratory and distributed to the most compatible recipients in the state of Illinois. If no suitable Illinois recipient can be found, the kidney is placed through the computer system of UNOS. Once placed, the kidneys are put on a portable preservation machine, taken by ambulance either to a local transplant center or to an airport and flown anywhere in the country accompanied by a member of the procurement team.

"Unfortunately, organ preservation is still very primitive," Dr. Jensik says. "At the present time, organs are best preserved under hypothermic conditions—at temperatures lower than body temperature, usually around 36° to 38°F. At these temperatures, cell metabolism is slowed drastically so that, in the absence of the body's normal nutrient circulation, there is only very minimal, short-term damage to the tissues."

Kidneys can be preserved one of two ways, both involving hypothermic conditions. The organ can be placed in a pulsatile machine where a constant stream of nutrients is pumped through the organ, mimicking the blood flow to and from the heart. The fluid is kept at cold temperatures and consists of a specially mixed electrolyte solution designed to minimize cell damage. This method of preservation is called pulsatile machine preservation, and for many years has been the standard method of preservation in the United States.

Another method, more popular in Europe, involves placing the organ in a cold saline solution and profusing it with one liter of cold electrolyte solution to remove all the blood. The kidney's temperature is then lowered and the organ is placed in a sterile bag and transported in an ice suspension commonly called "slush" or "cold storage."

There are extensive studies now being conducted to evaluate these two methods of preservation. "We participate in one such study which



Program director Amy Peele frequently leads in-service discussions for staff who must approach families of prospective donors.

> *"In some cases organ donation may be a clear asset to the grieving process; in other cases, it could be... even detrimental."*
>
> **Rev. James Corrigan**

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is currently being conducted by the Illinois Transplant Society," Dr. Jensik says. "Although there are some clinical advantages to using the machine, there is economic incentive to place kidneys in cold slush."

Kidneys can now be effectively preserved under hypothermic conditions for 72-96 hours. Most transplant surgeons use 72 hours as the maximum time limit which is acceptable before reimplantation becomes problematic. There have been numerous anectodal reports, usually from Europe, where kidneys have been preserved up to 96 hours and then transplanted successfully, according to Dr. Jensik. "Hypothermic conditions do minimize the injury that cells and tissues suffer due to the absence of normal circulation. Nevertheless, there is a slow deterioration after approximately 100 hours," he says. "It is felt that the injury the kidney cells sustain is irreversible and that the organs cannot be successfully preserved beyond this time."

Many times after cadaver kidney transplantation, the blood flow is restored to the organ but the new kidney does not immediately begin making urine. This phenomenon—called acute tubular necrosis (ATN) or vasomotor nephropathy—is a reversible insult that the kidney undergoes and from which it will eventually recover. During the time that ATN occurs, transplant patients are treated with thrice weekly dialysis treatments, a schedule comparable to their dialysis routine prior to surgery. "Kidneys that are preserved over 48 hours have a higher incidence of acute tubular necrosis," Dr. Jensik says.

Hearts and livers preserved longer than six hours sustain comparable injuries which are often reversible if the patient can survive the period of weeks needed for the organ to repair this reversible injury. "Unfortunately for liver and heart recipients there is no effective, long-term mechanical substitute for these organs' functions," Dr. Jensik points out. "The new liver or heart is transplanted into a recipient usually after the patient's own diseased heart or liver has been removed. It must work fairly well immediately." Short preservation times, he emphasizes, are paramount. The shorter the preservation time for these more critical organs, the higher the likelihood of restoration of normal physiologic function.

The pancreas is also influenced by similar problems but is able to tolerate longer periods of cold preservation. Usually 16 to 24 hours can elapse before the donor pancreas needs to be reimplanted, giving transplant surgeons more time to prepare potential recipients for transplantation.

Bone can be stored up to two years at cold temperatures—usually −176°F in liquid nitrogen. "This is because cadaver bone allografts are poorly vascularized and do not involve the transplantation of living tissues," Dr. Jensik explains. "Instead, transplant surgeons simply use the bony matrix and articulating hyaline cartilage as a framework for new bone transplantation."

Corneal tissues are also poorly vascularized and can be preserved in individual, refrigerated vials, usually for 36 hours before transplantation.

"Hearts and livers with their short preservation times necessitate the very dramatic scenarios of helicopters, chartered jet planes and people dashing through corridors," Dr. Jensik says. Kidneys can be preserved longer, allowing time for the best possible match to be arranged.

Nevertheless, these are very short times in comparison to the potential that might be offered if these organs could be preserved for weeks and even months. If organ preservation could be perfected for these longer lengths of time, there would be higher rates of graft success because the recipient could be conditioned to accept a particular donor.

The Organ and Tissue Recovery Program is working with Howard M. Gebel, Ph.D., assistant professor, immunology, and director, of the General Immunology and Histocompatability Laboratories, toward that end. Dr. Gebel's work involves the use of immunologic reagents to treat various tissues—particularly pancreatic cells and other endocrine tissues—to modify them and make these tissues more acceptable for transplantation.

But, until preservation times are lengthened, the dramatic scenarios will be a way of life for Dr. Jensik, Peele and Malecki. (See page 23 for "A Night and a Day in the Life of the Organ Procurement Team.")

ORGAN PRESERVATION TIMES

Heart 5-6 hours

Liver 6 hours

Pancreas 16-24 hours

Cornea 36 hours

Kidney 72-96 hours

(Bone can be stored up to two years)

Since April, 1982, Malecki and Peele have organized 61 actual organ donations out of 143 referrals. One of these donations resulted in the first heart transplant case at The University of Chicago; another three hearts were placed with the Loyola University Medical Center Transplant Center. Four livers have also been recovered. One was transplanted into a two-year-old Medical Center patient. Kidneys have been matched with recipients throughout the United States.

Networking is the cornerstone of the Organ and Tissue Recovery Program at the Medical Center. "Networking began in 1973 with the inception of Medicare's End Stage Renal Disease Program which reimburses not only the costs of kidney transplantation surgery but also all procurement costs," says Paul Volek, M.P.H., administrator of the Organ and Tissue Recovery Program. "From 1973 to 1975, Rush-Presbyterian-St. Luke's Medical Center did all the procurement of cadaver kidneys for the state of Illinois and shared these kidneys through a statewide pool."

In 1975, transplant centers throughout the state decided to establish their own networks to avoid duplication of efforts and the appearance of competition between centers, and to provide referral hospitals with a single team through which to coordinate donor/procurement activities.

"Essentially we looked at all hospitals throughout the state and tried to pick hospitals which had the capabilities and existing programs to support a primary procurement center," he says. Once primary centers were selected, regional networks were set up using geographic proximity and the hospital's academic and corporate affiliations as guidelines. Each primary center identified between 20 and 40 hospitals for which they would serve as the primary procurement center.

The hospitals in the Medical Center's referral network are located east to Elkhart, Indiana, south to Kankakee, Illinois, west to the Galesburg, Illinois region, and north to the Wisconsin border. A recently established bone referral network extends into central Wisconsin.

Developing trust and a rapport with these hospitals has been a major thrust. "Without the support of our referral hospitals, we wouldn't have an organ procurement program," Volek says. "The Medical Center provides tertiary care and is not a trauma center so we can't rely on our own patient pool. We've had to go out and develop an active network of referral hospitals by essentially decentralizing procurement."

The staff of the Organ and Tissue Recovery Program also supports community education programs at the referral hospitals and conducts continuing education programs for the hospitals' physicians, nurses, chaplains and other personnel involved in the procurement process.

Depth and availability are also resources the referral hospitals can depend on. The Organ and Tissue Recovery Program has grown to the point that at any time three separate teams can be out at referral hospitals. "We have back up for the back up," says Volek, who himself was a coordinator for four years. "Two of us may not be on first call, but all of us are reachable within a 50-mile radius through pagers.

"We can have one team at Christ Hospital (in Oak Lawn, Illinois) working on a bone procurement while another team is out at Copley Memorial (in Aurora, Illinois) coordinating a multi-organ procurement with out-of-state teams," he says.

Another valuable resource the program provides is its active bone bank which was established in 1982. Cadaver bone is used in many different forms—whole, powdered, crushed—by many different specialties—orthopedic surgery, neurosurgery, dentistry and periodontics and in bone-related research.

"There are only a few active bone banks in the country that have enough bone tissue available for use outside their own regions," Volek says. "Through our bone bank, we can offer our referral hospitals first priority for their bone requests.

"Each of us—Dr. Jensik, Amy, Mindy, myself—believes that what we are doing is really important," Volek stresses. "We approach our jobs with almost a religious zeal."

The Organ and Tissue Recovery Program continues to evolve in very natural ways.

"We have gone from establishing a successful kidney procurement/transplantation program to developing a bone bank and the mechanisms for multi-organ donations," says Gordon Bass, M.M., associate vice president and associate administrator, surgical sciences and services. "The next areas we intend to develop are liver transplantation and the processing of fascia (thin membrane covering muscle) used in reconstructive eye surgery."

At this time, there are 20 liver transplant centers in the country and muscle fascia can only be obtained from an eye bank in

"Hearts and livers with their short preservation time necessitate the very dramatic scenarios of helicopters, chartered jet planes and people dashing through corridors."

Stephen C. Jensik, M.D.

Toronto.

"As we move into other areas, we involve other disciplines," he says. "All these areas involve different skills and not just for the surgeons. There may be different skill requirements for the anesthesiologist; kidney transplant patients have one set of care guidelines, liver transplant patients, another, so that involves our primary nursing care professionals and others on the health care team." The Organ and Tissue Recovery Program, Bass emphasizes, has far-reaching implications in terms of the role it plays in medical specialization as well as health care education not only for Medical Center staff but also for residents and medical and nursing students.

But, if preservation times and the current shortage of transplant teams and organs do not improve, transplant and organ procurement teams will continue to be the people with the pagers, connected to each other by telephone lines, emergency aircraft and ambulances, late night surgical procedures and the computer voice of the NATCO 24-ALERT.

A Night and a Day in the Life of the Organ Procurement Team

Monday, September 10:

9:30 a.m.

Malecki gets a call from Porter Memorial Hospital in Valparaiso, Indiana. A nurse in the Intensive Care Unit says that they have a patient who has been declared brain dead and whose family wants to donate his heart, liver, kidneys, corneas and bones.

Malecki and Dr. Jensik begin their evaluation of the patient with the ICU nurses by telephone making sure that all the necessary lab tests—including blood typing—have been ordered.

10:00 a.m.

The evaluation is completed and the donor's medical information is plugged into the NATCO 24-ALERT computer. Malecki gets a list of four matches—one Status I heart, one Status II heart, and two Status I livers—and begins calling transplant centers. The New England Organ Bank declines the liver because the donor does not meet the necessary criteria.

4:00 p.m.

Michael Bloch, organ procurement coordinator, University Hospitals, London, Ontario, decides—after numerous conversations back and forth with Malecki—that their heart transplant team is interested in flying in.

Malecki begins arrangements which include: notifying Porter Memorial that the Canadian transplant team will be flying in; arranging arrival and departure times with the Porter County Airport; notifying the preservation team that they should be ready to leave the Medical Center by 6:30 p.m.; arranging operating room time with Porter Memorial surgical nursing coordinator, Isabel Cardona, R.N., and then notifying Dr. Jensik of that time. Many donor procedures are scheduled at night because of the availability of operating rooms.

Malecki also reconfirms transportation arrangements with the Canadian team including ambulance transportation to and from the airport and arranges with the security department at Porter to escort them to and from the emergency room and surgery. Throughout all these arrangements, Malecki is in close contact with the nurses in ICU, keeping track of the patient's condition.

6:00 p.m.

Malecki, orthopedic surgery resident Craig Chertak, M.D., preservationist Joseph Wager, and two Rush Medical College students, Todd Janus, Ph.D., and Mark Simaga (who will assist with the surgery), leave the Medical Center with the kidney preservation machine, bone procurement and preservation equipment—and two pizzas and cokes for dinner.

The Medical Center team travels the one-and-a-half hours to Porter by limousine. The limo's size accommodates all the equipment and staff needed for organ donor surgery and provides a smooth ride for the preservation machine.

The team from London, Ontario, arrives at Porter Hospital, Valparaiso, Indiana.

7:30 p.m.
Once at Porter Memorial, Malecki talks to the donor's family and obtains signed consent forms; finalizes surgery arrangements with physicians and nurses at Porter; talks by phone to the Canadian team to confirm their time of arrival and discusses their surgical requirements; and reviews the medical status of the donor.

9:04 p.m.
Dr. Jensik arrives at Porter Memorial. He and Malecki again review the medical status of the donor.

9:10 p.m.
The Canadian team calls to say they have been delayed in Detroit where they have stopped to clear customs so they won't have to stop on the way back.

10:00 p.m.
The donor is taken to surgery.

10:10 p.m.
The Canadian team arrives at Porter, having been transported by ambulance from the airport to the hospital. The team times the ambulance ride so they can better gauge total travel time back to Canada.

The team, which is headed by cardiac transplant surgeon, Neil McKenzie, M.D., includes fourth-year medical student Harrison Pitcher, organ procurement coordinator Michael

Conferring before surgery: Michael Bloch, coordinator of Canadian procurement team; Mindy Malecki, Rush-Presbyterian-St. Luke's Medical Center, and Isabel Cardona, R.N., surgical supervisor, Porter Hospital.

Harvesting the organs—members of the Canadian team and the Rush-Presbyterian-St. Luke's team work together.

Bloch, and surgical nurse Elaine Yamamoto, R.N. Dr. McKenzie confers with Dr. Jensik, Malecki and Cardona and surgical arrangements are completed.

10:30 p.m.

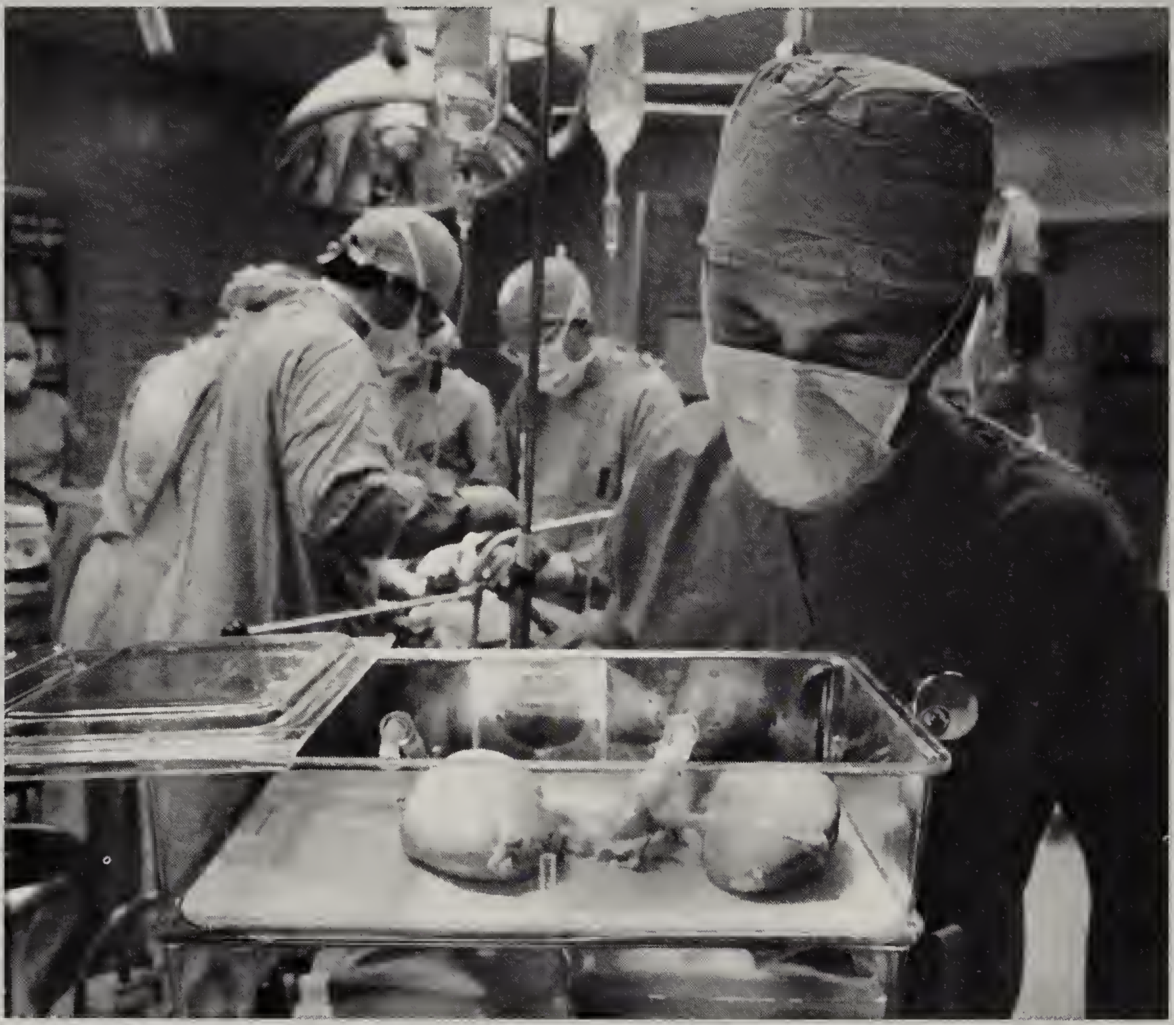
Surgery begins. Working together, the cardiac and kidney teams complete the preliminary stages of the operation prior to the surgical removal of the organs.

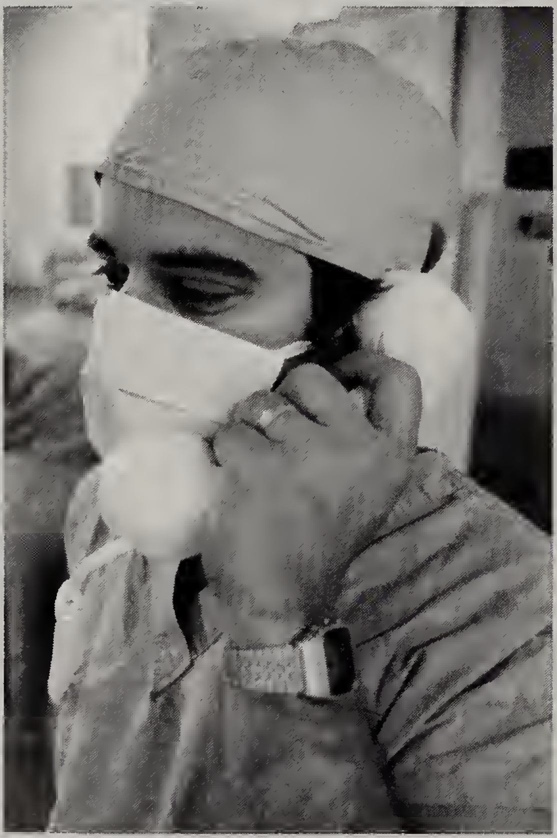
Throughout the operation, Bloch is in close contact by phone with the Canadian team at University Hospitals, where the recipient has been brought to surgery and is being surgically prepared to receive the donor heart. "When we are at a certain point in the operation, the recipient must be surgically prepped to a certain point," he says. "That's why we need to keep each other apprised throughout the operation."

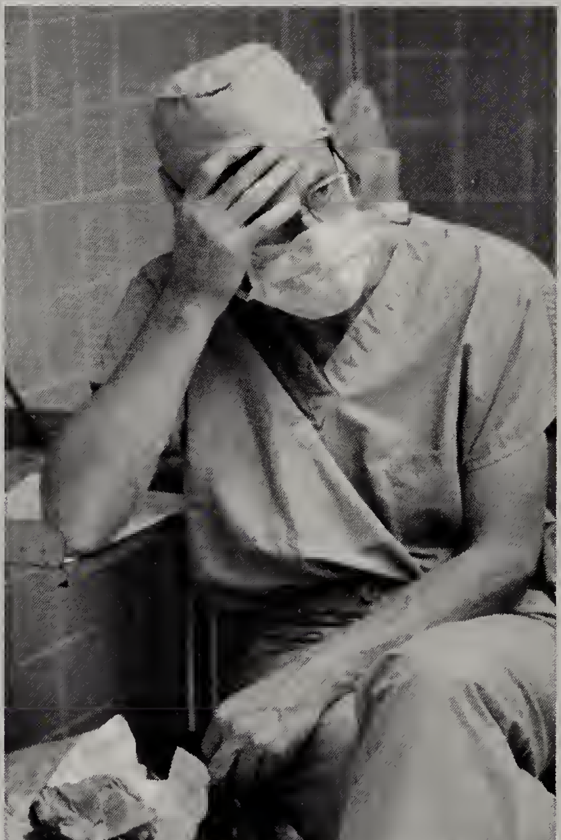
11:15 p.m.

The cardiac team infuses flush solution into the heart through the coronary arteries to lower the temperature of the heart as well as to prevent it from beating. This is a technique often used in open heart surgery where the heart is stopped and the patient is placed on a heart-lung machine. Following the administration of the profusion solution, the

Two members of the Canadian team, Neil McKenzie, M.D., and Elaine Yamamoto, R.N., chill the harvested heart.


The kidneys are attached to the pulsatile preservation machine.


Michael Bloch keeps in touch with the London hospital on status of heart recipient.


Dr. McKenzie takes a brief rest.

aorta is clamped; similarly, a profusion solution is infused into the kidneys through the illiac arteries in the groin. With the clamping of the aorta and the infusion of both kidneys, ventilator assistance by the anesthesia team is stopped.

Tuesday, September 11

12:15 a.m.
The heart is surgically removed and placed in a basin of chilled saline solution to be prepared for the trip back to Canada.

12:16 a.m.
The kidneys are removed and put in an iced solution similar to that of the heart.

12:47 a.m.
The heart and kidneys are ready for preservation/transportation. The heart is quickly placed in a suitable cold storage container and the Canadian cardiac team prepares to leave. The kidneys, under sterile conditions, are surgically attached to the pulsatile preservation machine by Dr. Jensik.

12:57 a.m.
The Canadian team leaves by ambulance for the ten-minute ride to Porter County Airport. The return flight takes approximately one hour and fifteen minutes. Throughout the flight, Bloch is in contact with the surgical team in London. Once the team reaches London, they will be met by an ambulance and taken to the hospital where the recipient has been readied to receive the heart.

1:00 a.m.
The kidneys have been placed on the preservation machine. The preservationist takes over

the care of the kidneys throughout the trip back to the Medical Center and the tissue-typing and placement.

1:05 a.m.
The Porter ophthalmologist arrives to remove the corneas. The corneas are recovered under the auspices of the Indiana Lion's Club which finds suitable recipients in the local Indiana area.

1:10 a.m.
The donor is prepped for orthopedic donation. The abdominal/thoracic incision is closed and the patient positioned and surgically prepped as if an operation is to be performed to keep the incidence of infection in the procured bone to a minimum.

1:45 a.m.
Malecki and Dr. Jensik leave Porter Memorial Hospital for the return trip to Chicago.

4:45 a.m.
The orthopedic resident, medical students and preservationist leave for the Medical Center with the donor's kidneys and bone.

Over the next four to five hours, the kidneys will be tissued-typed, those results fed into the UNOS computer and transplant centers contacted.

10:00 a.m.
Malecki and Dr. Jensik are once again on their way—this time to Skokie Valley Hospital for a kidney and cornea donation.

4:10 p.m.
The kidneys from the Porter hospital donor have been placed with two transplant centers in Michigan and arrangements completed to send them.

Carrying the heart in a special case, members of the Canadian team prepare to fly back to London.

Take off.

Case History of a Transplant

For 32-year-old Wardell Sivels, it started out as a suspected case of the 24-hour flu. "I began feeling sick around Christmas-time," he recalls. "I was running a temperature and couldn't keep anything down," By early January, the "flu" was diagnosed as renal failure, and, shortly afterwards, Wardell found himself depending on a dialysis machine, three treatments a week, four hours each treatment.

In March, one of Wardell's physicians suggested a kidney transplant if a compatible donor could be found. Wardell and his mother sent to the American Kidney Foundation for information about organ transplantation and transplant surgeons. Of the 150 transplant centers located throughout the United States, seven are in the state of Illinois. Wardell decided to see kidney transplant surgeon Stephen C. Jensik, M.D., Ph.D., because he was recommended by the staff at his dialysis center. Dr. Jensik is the medical director of the Organ and Tissue Recovery Program at Rush-Presbyterian-St. Luke's Medical Center and assistant professor, Rush Medical College.

"I called Dr. Jensik's office on Tuesday and saw him on Friday," Wardell remembers. "He gave me a thorough examination and we discussed the advantages and disadvantages of transplant surgery."

The advantage of the successful transplant is that it restores a normal organ which performs all the functions that the patient's own kidneys used to do. The kidneys' main function is to cleanse the blood but there are hundreds of functions which they perform that are not understood very well or at all. This is why the successful transplant is probably the best treatment for kidney failure.

"When transplants are successful, the rehabilitation of the patient is immeasurably improved over dialysis," Dr. Jensik says. "Patients have no dietary or fluid restrictions, time is no longer spent undergoing lengthy dialysis treatments and the rehabilitation potential to return to work and a normal lifestyle is usually much greater."

But, not all transplants are successful. Many problems stem from organ rejection. Rejection, simply put, is an inflammatory response. "The recipient's body is fighting off a foreign body," Dr. Jensik explains. "White blood cells, which are part of the body's defense system, attack the new kidney."

Potential recipients like Wardell are told that they must take immunosuppressive medicine in the right dose for the rest of their lives to prevent rejection. They are also made aware that it's a balance the health team is not able to achieve 100 percent of the time.

Dr. Jensik also told Wardell that he could reduce the possibilities of organ rejection if a living, related, tissue-compatible donor could be found.

Wardell's close-knit family rallied to the cause. Three brothers and one sister came to the Medical Center to undergo medical tests to see if their tissues were compatible with Wardell's and, through extensive medical examinations, if they could safely donate a kidney. It turned out that younger brother Leo would make the best donor.

Had Wardell not been able to find a tissue-compatible donor, he would have had to join the more than 700 people in the state of Illinois awaiting a new kidney. Recent statistics show there were approximately 3,000 end stage renal disease (ESRD) patients, of

The transplant team for Wardell Sivel's kidney transplant: (from left) Albert K. Straus, M.D., Linda Haggerty, M.S., R.N., and Stephen C. Jensik, M.D., Ph.D.

"Each of us—Dr. Jensik, Amy, Mindy, myself—believes that what we are doing is really important. We approach our jobs with almost a religious zeal."

Paul Volek, M.P.H.

Stephen Jensik, M.D., Ph.D., flushes out Leo Sivel's kidney prior to transplantation into his brother, Wardell.

which nearly 1,500 were potential candidates for transplantation. Only 229 kidney transplants were performed in Illinois in 1983.

Brother Leo, like all living-related donors, had to meet several criteria to be considered for donation. First, and most important, a donor must be willing to donate, and be in perfect health. Leo had to undergo a number of sophisticated tests and evaluations to be sure he wouldn't lose his other kidney. An intravenous pyelogram (IVP) was performed to make sure he had two kidneys. Although very few people are born without two kidneys, there is that potential, so it's better to find out early on rather than on the day of surgery.

"The minute my family learned that transplantation was possible, they started pestering me to have it done," Wardell says. "I was the reluctant one, wanting to take some time to think it over."

End stage renal disease (ESRD) is one of the nation's major health problems and causes of death. Like Wardell, patients suffering from ESRD may choose one of three therapies: hemodialysis, peritoneal dialysis or transplantation.

It wasn't until 1974, with the inception of Medicare's End Stage Renal Disease Program, that dialysis became an affordable treatment option. Through this program, 80 percent of the cost of dialysis is paid by the government, regardless of the person's age or financial background.

"Although dialysis was recognized as a life-saving way of supporting these patients, ESRD was still an irreversible situation," says

Linda Haggerty, M.S., R.N., explains medications to kidney transplant patient, Wardell Sivels, following surgery.

Paul Volek, M.P.H., administrator of the Organ and Tissue Recovery Program. "For the many patients who do well on dialysis, there are just as many who do not. Children do not grow or develop normally. Teens often do not perform well at school or adults at work, and many suffer severe psychological problems."

Transplantation offers a viable alternative which gets patients off dialysis and restores them to a state of health comparable to the one they enjoyed prior to the onset of kidney disease.

In the long run, transplantation is also less expensive. Kidney dialysis costs about $25,000 per patient per year, while kidney transplantation has a one time cost of $30,000 to $35,000, with a cost of $5,000 to $6,000 per year post-surgery. The cost of kidney, cornea and bone marrow transplants are commonly paid for by all the major group health insurers. Heart, heart-lung and pancreas transplants—considered by some to be still experimental—are only beginning to be reimbursed by these group payers.

Pressure is building to have the government pay for these transplants as well. A heart transplant can cost $70,000 and a liver transplant, $80,000 to $100,000. Many health care experts and legislators feel that it is less expensive to treat kidney, heart and liver diseases with a transplant than to treat these diseases—considering the high cost of specialized care in cardiac care units and intensive care units—until the patient dies.

Wardell decided to have a kidney transplant because, he says, "you have to constantly deal with the (dialysis) machine. No job wants you because they think you're fragile material.

"I was a truck driver before the problems started," he said. "After the transplant, I'm going back to school, maybe in refrigeration. I want to start a new career as soon as possible. My wife works full-time and I've got two kids. I've got a family to hold together."

Once Wardell's decision was made, preparations for the transplant began. A pint of blood was drawn from Leo and transfused into Wardell over a period of three visits. Donor-specific blood transfusions are part of the pre-surgical work-up. The transfusions, which were developed in 1979 at the University of San Francisco, condition the recipient to accept a kidney from the donor. The transfusions also serve as one more way of testing donor-recipient compatibility.

Wardrell also underwent needed dental surgery. "We make every effort to eradicate any possible source of infection prior to surgery," says Linda Haggerty, M.S., R.N., clinical coordinator of the transplant team. Haggerty makes all the pre-surgical work-up arrangements, arranges consultations with other physicians if necessary (as in the case of Wardell needing periodontal surgery), and answers questions and provides information for both recipient and donor.

Leo Sivels entered the hospital on Labor Day, a day before Wardell, to have an arteriogram performed. This shows surgeons the number of arteries to both kidneys. The kidney with fewer arteries is removed. And the extra day is needed to flush out the dye used in the arteriogram. "We used to admit both the donor and the recipient at the same time, but the recipient really doesn't need to be in the hospital that extra day, so the cost of one day's hospitalization is saved," Haggerty says.

"When you have to constantly deal with the dialysis machine, no job wants you because they think you're fragile material."

Wardell Sivels (kidney recipient)

Both young men had similar recollections about the surgery. "One minute I was lying next to Leo in the pre-surgery room," Wardell remembers, "the next thing I remember was waking up, looking over to see Leo missing and asking a nurse when they were going to take me to surgery. I was surprised to discover the operation had been performed."

During the three-and-one-half hours Wardell couldn't remember, two surgical teams had performed the kidney transplant. Brother Leo, the donor, was taken to surgery first, prepped and the surgical procedure to remove the kidney begun under the surgical direction of Albert K. Straus, M.D., assistant professor, surgery. At the same time, in a different operating room, Wardell was prepped and surgically prepared to receive the kidney.

"The surgical procedure for renal transplantation has been perfected over the past fifteen years to the point that the operation is extremely standardized and is the least risky part of the renal transplant," Dr. Jensik says.

A common misconception is that the recipient's own kidneys are removed and a new kidney put in their place. The recipient's own kidneys, in fact, are almost never removed unless it is medically necessary.

The blood vessels of the donor kidney are connected to the blood vessels of the recipient in the flank, usually to the iliac artery and vein. This gives ample length for the donor kidney's ureter to be reimplanted in the recipient's own bladder.

Wardell spent one post-surgical day in the Surgical Intensive Care Unit for fluid management before being transferred to a surgical nursing unit. "I was up the day after surgery, feeling fine," he marvels.

Leo was taken to the surgical nursing unit. A donor's surgery is treated in a similar manner to abdominal surgery with a five- to eight-day postsurgical hospital stay, followed by out-patient visits to the surgeons.

"Although many donor's families feel that they will be visiting the recipient after the operation, the extent of the surgery is such that the donor usually has more discomfort and it is, ironically, the recipient who is the first one to visit the donor," Haggerty says.

In the days following surgery. Haggerty, working closely with nurses on the surgical nursing unit, teaches patients like Wardell to take their own blood pressures, pulse count and temperature, weigh themselves, and follow the medication schedules. A kidney recipient takes anywhere from four to seven different types of medication, each on a special time schedule.

"The strict medication regimen helps prevent organ rejection and infection," Haggerty says. "Blood pressure, temperature and weight monitoring will help patients determine if rejection is occurring."

An elevated temperature, tenderness in the kidney site, extremity swelling, decreased urine output and feeling tired are some of the signs of organ rejection. "Patients can have just one of the rejection symptoms," she points out. "That's why it's so important that they learn to recognize the danger signals and call us if they suspect something is not right."

Call us. Two very important words for Haggerty and Dr. Jensik. "Patients have to know that we're available to them, 24 hours a day, 365 days a year," Haggerty stresses. "I carry a beeper constantly and am available to talk to patients at all times of the day or night. It's so very important for them to understand that there is no such thing as a small complication!"

This kind of team approach is instrumental not only in supervising patients' immunosuppressive medicines and watching for signs of rejection, but also in helping them find resources for many of the social and psychological problems associated with any chronic disease. Many patients with renal failure have been laid off at work; many have diabetes and suffer from systemic diseases with severe disabilities many of which are not improved dramatically with transplantation. This requires coordinating treatment with counseling provided by other health care specialists such as social workers, rehabilitation specialists and dietitians.

"The nurse is the pivotal figure, coordinating the efforts of these experts in the outpatient rehabilitation of transplant patients," Dr. Jensik says.

Patients begin their life-long care with outpatient visits, usually three times a week, tapering to once a month following the three to six month post-surgical period when rejection is most likely to occur. "Although rejection problems are much less common after 90 days, they can occur," Haggerty says, "which is why we monitor our patients' conditions for the rest of their lives."

When Wardell comes in for a visit Haggerty will review the daily log all patients are asked to keep of temperature, blood pressure and pulse count to be sure all are within normal ranges. A blood sample is taken to monitor renal function and gauge Wardell's general medical condition. Dr. Jensik and Haggerty

"It's so important for transplant patients to understand that there is no such thing as a small complication."

Linda Haggerty, M.S., R.N.

Happy ending of a transplant story: (from left) Leo Sivels, kidney donor; Wardell Sivels, kidney recipient; (rear) surgeon Stephen C. Jensik, M.D., Ph.D., and nurse Linda Haggerty, M.S., R.N.

also review his medicines.

The medicines used for transplant patients—cyclosporine, immuran and prednisone—work in combination to reduce the chances of rejection and all these medications must be taken in the correct dosage.

"Cyclosporine, as any drug, does have side effects of its own," Dr. Jensik says. "High doses of the drug, ironically, are toxic to the kidneys. This toxic effect is reversible when the dose is reduced." Lesser incidence of side effects include hirsutism (hairiness), tremor, elevated liver enzymes and skin rash.

"There was an initial concern when the drug was first introduced that it was responsible for a high incidence of new malignancies," he says, "but researchers discovered that these occurred only when the drug was used in very high doses in conjunction with high doses of other conventional immunosuppressive drugs."

One of the most unpleasant "side effects" of cyclosporine is its cost—between $5,000 and $6,000 a year. Patients not on cyclosporine can take a higher dose of prednisone, which is less expensive but can cause long-term problems. Or the spleen, which in adults makes some types of white blood cells, can be removed to lower the patient's problems with these cells attacking the new kidney. With this option, however, other organs must be relied upon to perform the spleen's functions.

Even with these restrictions, transplant patients can lead productive lives. Wardell is still recuperating, but looking forward to enrolling in refrigeration school. Other patients of Dr. Jensik have already made the transition to a full, active life. "One of our patients, who was a licensed practical nurse, completed a registered nursing degree and recently passed her boards. Another adopted two children following her transplant," Haggerty says. "One patient is 61 years old and works out at the health club every week. And one of our donors had a baby on the two-year anniversary of the day she donated a kidney to her sister!"

"It's a double-edged sword," Dr. Jensik says. "Ideally, successful transplant is the preferred treatment for end stage renal disease. The patient now has a functioning kidney and is able to lead a reasonably normal life, without the constraints of dialysis treatments."

But recipients also must live with the possibility of organ rejection at any time, the cost of the surgery coupled with the yearly expense of the anti-rejection drugs and the side effects of these drugs.

Dr. Jensik remains cautiously optimistic. "Cyclosporine has been beneficial for recipients," he says. "The success rate for transplantation has greatly improved since its discovery. Current research will hopefully solve the problems we've been having with side effects from cyclosporine."

Financial support is also in the offing. Illinois Governor James Thompson recently signed The Experimental Organ Transplant Procedures Act, the first law of its kind in the country. The law, which will go into effect in July, 1985, provides legislation for a 12-member board to screen applicants for state assistance for transplants. Insurance companies now will no longer be able to deny reimbursement for transplant surgery based solely on considerations of whether the procedure is experimental.

> *"As the cost continues to rise there will have to be a breaking point where some benefits will have to be limited in order to be more inclusive in our care."*
>
> **Rev. James Corrigan**

A Question of Ethics

Popular magazine and daily newspaper focus heavily on the latest medical breakthroughs. Cancers treated without extensive, deforming surgery; tissues diagnostically probed with high tech magnetic resonance imaging to detect the very beginnings of disease; and body parts rebuilt or diseased organs replaced with new, healthy ones.

The reader may not understand all the medical jargon in these articles but the message seems clear—anything is possible. Medical science and technology can help no matter what the disease or medical problem.

For many diseases and conditions this is now true. But the high tech/specialized expertise required costs money and often reaches only a handful of patients. More and more the questions are being asked..."Who gets the treatment?" and "Who pays the bill?"

Our nation's health care expenditures in 1982 rose to $321.4 billion, seven times that of 1965 when the government began funding medical care through Medicare and Medicaid. Private insurance companies have also been raising premiums to keep pace with upwardly spiraling medical costs.

In 1983, the federal government considered lifting the "experimental" status of liver transplantation, making the procedure more accessible to thousands of critically ill children and adults. But, at more than $100,000 per transplant procedure, this would mean a huge drain on the nation's health budget.

Physicians are charged with saving lives and the medical profession continues to develop better, and, in many cases, more expensive ways to attain that goal.

But how much is too much to spend to save a life? No one, at the moment, has the answer.

Proponents of transplants point out that the cost of a transplant is less than the cost of maintaining patients throughout the long course of their chronic diseases. "It may turn out that organ transplants are a bargain, but we don't know that yet," Dr. Roger Evans, of the Battelle Memorial Institute, in Seattle, pointed out in a recent *Chicago Tribune* article. "The overall results we see today indicate that heart transplants are a cost-effective approach."

Most studies now show that successful kidney transplants not only provide a more superior quality of life than dialysis, but also are, in the long run, the least expensive way to treat chronic end stage renal disease.

But ethical and medico-legal questions surround the distribution of life-giving health resources in general. "We are beginning to look at the ethics of near unlimited use of health care resources for some—such as the hundreds of thousands of dollars it can cost for one transplant or for the treatment of one chronically ill patient—in the face of our inability, to date, to provide basic health care needs for so many others," says Reverend James Corrigan, clinical coordinator of pastoral services at the Medical Center. "How do we decide where to allocate our resources and to whom?

"To date, we have been trying to respond to all the health care needs of some segments of society. But as the cost continues to rise there will have to be a breaking point where some benefits will have to be limited in order to be more inclusive in our care.

"I don't envy the people who will have to make these most difficult decisions," he says.

Organ transplantation raises many questions for which professionals, organizations and government are trying to formulate answers. For instance: Who gets the organs? "Some people advocate the buying and selling of organs, reasoning that organs are in short supply and financial incentives would serve to increase the supply," says Stephen C. Jensik, M.D., Ph.D., medical director of the Rush-Presbyterian-St. Luke's Organ and Tissue Recovery Program. "The commercialization of organ donation, however, would violate the general concept of medical care being available to all members of society. The result would be serious disillusion and disdain on the part of the general public and a net reduction in the availability of transplantable organs."

Rev. James Corrigan

Recent federal legislation has been passed prohibiting the buying and selling of human organs for transplantation. The American Society of Transplant Surgeons and other similar organizations have also established strong ethical guidelines for their members, forbidding this practice.

Religious leaders were among the first non-medical people to examine closely the implications of organ transplantation. Catholic, Protestant and Jewish faiths feel that because saving a human life is a primary goal of the law, the removal of an organ after death in order to save another human life does not violate the sanctity of the deceased, but rather is a blessing.

Political issues have also entered into organ procurement/transplantation. Some transplant surgeons have been giving priority to patients from other countries who are able to pay more than patients in this country. This practice has spurred national level discussions as to the advisability of using donated organs in this way. Many health institutions, including Rush-Presbyterian-St. Luke's Medical Center, have already addressed this issue, instituting practices restricting the use of organs donated in this country for patients in other countries.

How then are organs distributed? "Right now," says Amy Peele, R.N., director of the Organ and Tissue Recovery Program, "more 'critical' organs such as the liver or heart are placed according to how sick the patient is. Organs which can be preserved for longer times, such as kidneys, go through extensive tissue-typing and are given to recipients with which they are the most compatible."

The very act of donating organs has also come under medical and government scrutiny. Since the 1950s, volunteerism and informed consent have served as moral guidelines governing the procurement of organs. With the emergence in the 1960s of transplantation as a viable treatment option, voluntary organ donation was not sufficient to assure the supply of organs needed by recipients.

Many options were considered including presumed consent, whereby physicians, acting with state or federal authority, could simply take needed tissues and organs from cadavers unless the individual carried a card prohibiting such tissue transfers or unless the deceased person's next-of-kin objected. This aggressive policy was tabled because of its cooercive nature and potential to violate individual rights.

Other guidelines, eventually accepted, provided individuals with the opportunity to establish living wills or sign donor cards and, in the absence of such permissions, permitted families to make the decision to donate. These are incorporated into the Uniform Anatomical Gift Act of 1975.

But this Act did not shorten the gap between the number of organs available and the number needed by potential recipients. "The federal government has periodically explored the possibility of making organ donation financially reimbursable," Dr. Jensik says. "This has been met with the objections that it would lead to abuses in the commercial buying and selling of organs."

"Discussions are now going on to require hospital staffs to ask families if they would like to donate

At the present time, more critical organs, such as the kidney shown here, are placed according to how sick a patient is.

"There are enough potential donors each year to meet the needs of recipients. Unfortunately, not enough families are being asked."

Amy Peele, R.N.

their relative's organs," Peele says. The Joint Commission on Accreditation of Hospitals is also considering requiring hospitals to have an active policy requiring families be asked before accreditation is given.

"There are enough potential donors each year to meet the needs of recipients," Peele says. "Unfortunately, not enough families are being asked."

Required consent has evolved in part because many hospitals are reluctant to be more active in organ donor procurement either because of the perceived medical/legal liability for organs procured at their hospitals or because of the cost of such participation.

"The liability for procured/transplanted tissue falls completely on the surgeons who remove, preserve and transplant those tissues," Peele points out. "And cost is assumed by the procurement center and the transplant centers, not the referral hospitals."

The passage of the Organ Procurement and Transplantation Act in October, 1984, should help solve some of these problems and clear up misconceptions. The Act provides for a nationwide task force—made up of transplant surgeons, procurement coordinators, medical ethicists, lawyers, private health insurers and citizens—to look at the many problems surrounding transplantation/organ procurement today. The task force has been charged with:

- assessing public and private efforts to procure human organs for transplantation
- assessing the problems in coordinating procurement efforts
- recommending guidelines for the education and training of health professionals with respect to organ procurement
- providing recommendations for assuring equitable access by patients to organ transplantation
- identifying barriers to organ donation by patients
- recommending guidelines for the conduct and coordination of continuing research covering all aspects of organ transplantation
- analyzing factors involving insurance reimbursement for transplant procedures and immunosuppressive medications by private insurers and the public sector
- assessing the feasibility of establishing a national registry

The cost of organ transplantation is great...but how much is too much to spend to save a life?

of human organs.

Help, it would appear, is on the way. But, as this attempt to narrow the gap between availability and demand and to increase hospital and public awareness began to take shape, along came "Baby Fae."

"Baby Fae represented a spectacular, but by no means isolated, example of a patient desperately in need of an organ transplant," Dr. Jensik says. "There are patients every day who die from terminal liver and heart disease because a suitable donor organ cannot be found in time. Baby Fae's transplantation was an extraordinary attempt to bypass the very critical problem of donor organ shortage.

"Here was a child with an uncorrectable fatal cardiac problem and with very limited time to survive. Here was a situation in which there was a very miniscule probability of finding a suitable donor of comparable size for organ transplant," he explains.

Leo M. Henikoff, M.D., professor of pediatrics and a member of the AMA judicial council, was quoted in *American Medical News Weekly* as follows:

"This is not a question of medical ethics," he said. "This is a question of medical practice."

"...Speaking for myself, I think that the use of animal tissue in a human is not unethical in any way, shape, or form.

"For 10 years, we have been using pig valves in cardiac surgeries and, obviously, nobody thinks that this is unethical. Now, pig valves are dead tissue; it's like using metal. But if you use animal tissue as a transplant and that tissue survives in a human, that, too, is not unethical. It is a question of what is the best opportunity for the patient to have a viable, surviving heart. Animal tissue is less likely to work than human tissue, but human tissue is not always available.

"It's not an ethical issue, but the Baby Fae case has overtones that are semireligious. Symbolically, many people do not want to see animal tissue in a human. An orthodox Jew, for example, might refuse cardiac pig valves because they come from a pig. But that's a religious reaction, not an ethical reaction. We're seeing a semireligious reaction in this case.

"The Baby Fae case raises many questions. Did the California team have time to find a human infant heart? Does the team have the capability to do cross-species heart transplants with no greater risk than that posed by human transplants? It would have been best if they had had an infant human heart to transplant, but if they did not have time to find one and if the baboon heart were the therapy of last resort, it's hard to criticize them....

"If this works in Baby Fae and if infants under one month can get heterografts and have them stick and work, then that's terrific and a real breakthrough. If it only works for two weeks to six months, that's not all bad either. You're using the baboon heart to buy time to try to cross-match and find a human heart. Right now, all these kids are dying."

Baby Fae's case prompted many questions for medical ethicists. Was there informed consent on the part of the parents? Did the parents have the right to sign for their child, especially for a "highly experimental" procedure? Would this type of procedure cause irreparable psychological damage to the child in later years? Was enough scientific preparation and research done prior to the surgery? How much peer review is necessary before these procedures can be performed on humans?

None of these is an easy question to answer. Many people from medicine, religion and government are seeking answers, but the debate continues. ⓤ

To become an organ donor (in Illinois). Fill out a "Uniform Donor Card," which can be obtained from the Illinois Transplant Society, Inc., 222 West Adams, Suite 316, Chicago, Illinois 60606. This card enables you to indicate what you wish to donate: all organs; specific organs only; or your entire body for medical research. You should carry this card with you at all times. For those who drive, there is also a sticker, reading "Organ Donor," which can be affixed to a driver's license.

Medical Meetings Offer Science Insights and Advances

By Carolyn Reed

"...Most of us believed 50 years ago that medicine had already come its full distance...(but) The isolation of pure penicillin...in 1939 and the subsequent devising of techniques for its mass production in 1941 finally convinced everyone that medicine had entered a new era of powerful, decisive and real therapy...Medicine began to become a different profession, with its central and obsessive ambition now the cure of disease by biomedical science. And it has never looked back."

Lewis Thomas, M.D.
Speaking on the occasion of Samuel G. Taylor III, M.D.'s 80th birthday, October 10, 1984

"Biomedical science" is the watchword for the new era that continues today. And nowhere is the predominance of science more obvious than in the proliferation of medical/scientific meetings, seminars and symposia held each year in the United States. Therein findings are presented and insights shared; researchers assess their individual and collective progress, and draw into their ranks new members excited by what may be just over the horizon.

Four major conferences held at or sponsored by the Medical Center last fall contributed not insignificantly to the forward march of this new era of medicine. In September, in cooperation with the American Society of Clinical Hypnosis, the Department of Psychiatry sponsored the First International Conference on Multiple Personality/Dissociative States. Over 400 physicians and mental health professionals from as far away as Australia came to hear current concepts on diagnosis, treatment and research for these complex, but no longer considered rare, phenomena. In October, the Section of Oncology celebrated thirty years of progress in the field of cancer care and research and looked to the future at a day-long symposium, featuring an internationally-renowned faculty.

In early November, the Department of Diagnostic Radiology and Nuclear Medicine hosted its Eleventh Annual Course on Computed Tomography. For the second year, magnetic resonance imaging (MRI) was added to the curriculum. The two-day course included presentations of findings from some of the latest comparative studies of CT and MRI for the early diagnosis of disease.

And on November 12, to officially dedicate the Bone Marrow Transplant Center, Rush Medical College sponsored "Current Status and Problems of Bone Marrow Transplantation." Faculty of the Medical Center's program were joined by representatives from three of the country's largest bone marrow transplant centers—the University of Washington, Johns Hopkins, and Memorial Sloan-Kettering. The University of Chicago's Leon Jacobson, M.D., was the keynote speaker. Dr. Jacobson's pioneering work on radiation in the 1940s first demonstrated that transplanted marrow could repair lethal radiation damage.

Each meeting drew hundreds of clinicians eager to expand their personal knowledge of the subject matter. In some cases, the program was an opportunity to understand, for the first time, the nature and significance of the disease in question. As far as medicine has come, it still has a long way to go. Summary reports of each of the meetings follow.

Multiple Personality Conference

The conference on multiple personality/dissociative states offered just such a forum, for the exchange of basic diagnostic and treatment information. The seventy-five member faculty included Cornelia Wilbur, M.D., professor emeritus of the University of Kentucky and renowned therapist of "Sybil;" Richard Kluft, M.D., of Temple University, who has treated the largest number of multiple personality disorder (MPD) patients in the world; and Frank Putnam, M.D., of the National Institute of Mental Health, who has done research describing the psychophysiologic changes MPD patients undergo.

"An increased understanding of the psychological and biological processes underlying these conditions should yield information about 'everyday' psychopathology which relates to human coping and conflict resolution," said Jan Fawcett, M.D., in his opening remarks. Dr. Fawcett is the Stanley G. Harris, Sr., professor and chairman of psychiatry at the Medical Center.

Findings presented over the two days included evidence of a disturbing link between violent child abuse and the development of MPD; the presence of dissociative disorders, including MPD, in several generations of the same family; and documented physiologic changes such as altered brain wave patterns, differing allergic reactions and variations of left or right-handedness in MPD patients. Course director Bennett Braun, M.D., noted that, "Like leukemia affects the body, abusive parents can be malignant to the child and the entire system. It appears that as a consequence (of adapting to these traumas), anatomic pathways and neurophysiology can

At the Multiple Personality Conference: (from left) Jan A. Fawcett, M.D., the Stanley G. Harris, Sr., professor and chairman of psychiatry at the Medical Center; Cornelia Wilbur, M.D., and Bennett G. Braun, M.D., director of Rush's multiple personality program.

change in ways we are only beginning to conceive, measure and understand."

Dr. Braun, who as a private practitioner has been a co-investigator with Drs. Kluft, Putnam and others, joined the Medical Center faculty full time in December, and began a Dissociative Disorders Program at Rush in January, 1985. The department will co-sponsor a second international conference in October, 1985.

Oncology Symposium

"There have been cancer therapies for thousands of years," observed Thomas C. Hall, M.D., "but only recently has the nature of cancer, its cause and its spread begun to be understood."

Dr. Hall, director of the Cancer Research Center of Hawaii, retraced the early years of modern cancer care and research, beginning with the mustard gas findings arising out of World War I and concluding with the early chemotherapies of the 1940s. About that time the role of hormones in cancer was addressed by a young endocrinologist at Presbyterian Hospital, Samuel G. Taylor III, M.D., and others. Hormone manipulation appeared to be another, perhaps more effective, way to understand and control cancer, according to B. J. Kennedy, M.D., of the University of Minnesota. Dr. Kennedy underscored the importance of staging the disease and determining the presence or absence of certain "receptors" in deciding what therapies or combinations of therapy (surgical, radiologic and/or chemical) should be used. To coordinate a multi-modality approach to cancer care, Dr. Taylor organized the country's first hospital-based medical oncology section at Presbyterian Hospital in 1954. Today the section is one of the most active clinical research groups in the country.

Progress in cancer research has not marched necessarily straight forward, however. In recent years vaccines, interferon and monoclonal antibodies all have appeared to have some sort of potential for dealing effectively with certain kinds of cancer, noted Evan Hersh, M.D., professor of medicine at M.D. Anderson Hospital, Houston. "(Yet)...this kind of thinking has been around since the nineteenth century," he observed. Still the efforts of cooperative cancer groups, like the Eastern Cooperative Cancer Group (of which the Medical Center's section is a member), play an important role in testing new therapies and therapeutic agents, and their findings are narrowing the focus to the most promising areas of research.

Recent findings about the etiology of AIDS underscore the role the immune system plays in the genesis of cancer, and support a view long held by Dr. Thomas: that cancer erupts in that 25 percent of the population whose "immunosurveillance system" has failed to recognize it and crush its presence. Dr. Thomas first proposed his theory that the body has such a system to detect the early presence of disease in 1959.

"We know that some five percent of cigarette smokers get lung cancer, but what's amazing is that 95 percent don't," he said. "I like to think that more than luck is involved...if ever there was a good use for immunosurveillance, it's this."

The symposium concluded with a look into the future. Government regulation and cost containment are concerns, because research is expensive in the short-run. In the long-run, however, "research is the best way to be cost-effective in dealing with (cancer)," said James Holland, M.D., chairman of the department of neoplastic diseases at New York's Mt. Sinai School of Medicine. He had several specific predictions: that major advances in biology, especially our understanding of genes, will radically change the way we understand and treat cancer; that many cancers will be shown to be causally-related to viruses; that improved methods of diagnosis (such as magnetic resonance imaging) will make certain cancers curable because they will be discovered soon enough; that computers will play a major role in keeping all cancer clinicians up-to-date on current treatments and research; and that curbing smoking would make a sizable dent in health care costs and cut drastically the incidence of lung cancer and other debilitating respiratory diseases.

Research efforts in all these areas are underway at the Medical Center. Dr. Thomas, however, cautioned respect for serendipity, and noted that good science requires "...guesses in the dark, and almost total reliance on acts of the human imagination to uncover the mechanisms beneath the surface...the game will have to be played, as it has always been played, by individuals and groups of investigators relying on a hunch."

CT/MRI Course

Much of the two-day course was devoted to presentations of comparative studies. Researchers at Rush and other major medical centers with MRI equipment are still in the process of determining which conditions lend themselves best to CT exam, MRI exam or both.

Early findings seem to indicate that while MRI is a powerful imaging tool, clinicians should by no means dismiss CT. In many cases, it remains the preferable tool, especially for preliminary and/or emergency diagnosis.

Guest and Rush Medical College faculty reported that each technology has particular strengths, although their capacities at times overlap. In a series of head trauma cases, Robert D. Zimmerman, M.D., Cornell Medical Center, found that nothing was missed by the CT examination, but trauma was easier to see on the MR images.

Paul F. J. New, M.B., M.S., Harvard Medical School, noted that MRI is particularly sensitive in differentiating types of tissue in the brain and in detecting early stages of pathology, so important for diagnosing brain disease. However, the quality and validity of MR images is heavily dependent on the skill of the machine's operator. "There is no absolute scale of signal values, such as exists with CT," said Dr. New, "... the values change with magnetic field strength."

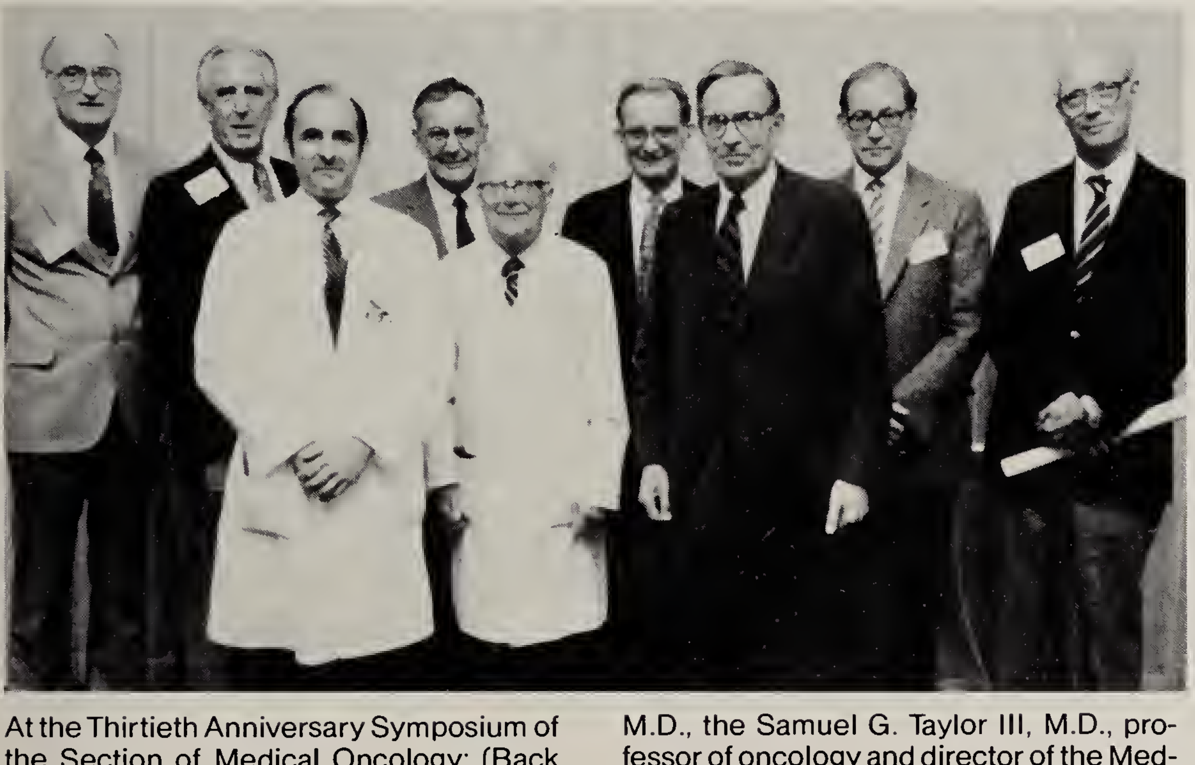
In contrast, results presented by Hillier L. Baker, M.D., Mayo Medical School, of an 18-month study of 1,200 patients showed MR imaging clearly superior in detecting and diagnosing certain kinds of brain tumors.

Course director Michael S. Huckman, M.D., professor of diagnostic radiology, and director of the Medical Center's section of neuroradiology, described the use of MR and CT images in diagnosing degenerative brain disease. According to Dr. Huckman, MRI will become "... an important tool in distinguishing between primary dementia such as Alzheimer's disease and arteriosclerotic dementia." He also described and demonstrated how MRI and CT could be used to diagnose multiple sclerosis, adrenoleukodystrophy and Huntington's disease.

Several presentations underscored the growing realization that MRI is not appropriate for certain patients: the very young, the very old, and those acutely ill, traumatized, combative or confused, who cannot tolerate the time and constraints of an MR exam. On the other hand, the lack of radiation weighs heavily in MRI's favor, for those situations where in all other aspects it equals CT.

The use of CT and MRI in diagnosing tumors, degenerative brain diseases, stroke, cervical spine and disk disease were discussed in detail. Ruth G. Ramsey, M.D., associate professor of diagnostic radiology, Rush Medical College, said, at the conclusion of her presentation, "I believe the future lies with MR for the diagnosis of disk disease, and that it will replace CT and myelography for diagnosis." Her reasoning, based on clinical studies over the past year: MRI is accurate, the procedure is relatively simple, and the patient is exposed to no radiation and little discomfort.

Other presentations focused on specific techniques for performing CT or MR exams of the eye, larynx, pharynx, the brainstem and cervical spinal cord, and specific portions of the brain itself. Guest faculty came from the Mayo Clinic, New York University Medical Center, the National Institutes of Health, Washington University School of Medicine, the Medical College of Wisconsin, Duke University School of Medicine, Columbia University-College of Physicians and Surgeons, Northwestern University Medical School, Harvard, Mt. Sinai School of Medicine, the Cleveland Clinic and Cornell Medical Center.



At the Thirtieth Anniversary Symposium of the Section of Medical Oncology: (Back row, l-r) Emil M. Frei III, M.D., B.J. Kennedy, M.D., D. Paul Carbone, M.D., James Holland, M.D., Evan Hersh, M.D., Thomas C. Hall, M.D. (front row, l-r) Jules E. Harris, M.D., the Samuel G. Taylor III, M.D., professor of oncology and director of the Medical Center's Section of Medical Oncology; Samuel G. Taylor III, M.D., founder of the Section, and Lewis Thomas, M.D.

Bone Marrow Transplant Symposium

Bone marrow transplantation has been done since the 1950s, but only within the last fifteen years has the procedure been accomplished with reasonable success. Bone marrow transplants are used to treat a variety of severe blood disorders including leukemia, aplastic anemia, and various immunodeficiency states.

Until the fall of 1983, most Chicago area residents suffering from these types of disorders traveled either to the University of Minnesota or to the East or West coasts for treatment. The Fred Hutchinson Center of the University of Washington, Seattle, is the largest program and one of the oldest. Transplant programs at the Memorial-Sloan Kettering Institute, New York City, and at the Johns Hopkins Oncology Center, Baltimore, also have been in place for some time.

Representatives from these distinguished programs served as guest faculty at the one-day symposium. Herbert Kaizer, M.D., Ph.D., formerly of the Johns Hopkins program, directs the Rush program. Initiatives in this area had begun several years ago when Solomon Adler, M.D., associate professor, internal medicine, went to study the procedure at the Hutchinson Center. Dr. Adler performed several transplants between 1980 and 1983. The six-bed Center opened officially in February, 1984, and has transplanted 14 patients in its first year.

The symposium began with a review of early studies by Leon Jacobson, M.D., emeritus professor of medicine from The University of Chicago. Dr. Jacobson's work in the 1940s laid the groundwork for today's clinical studies. The rest of the day focused on discussion and debate about current approaches to treatment, and problems in bone marrow transplantation.

The procedure remains an experimental therapy, according to Dr. Kaizer, best carried out in multidisciplinary treatment centers. Major problems include graft-versus-host (GVH) disease, the post-transplant state of immune system suppression, and the development of more effective methods of tumor eradication. GVH disease remains the most common complication. When GVH disease occurs, the transplant attacks the normal tissues of the patient's body. GVH disease is fatal in 20 to 30 percent of transplanted patients, according to George Santos, M.D., director of the Johns Hopkins programs, who described his work with allogeneic (from a matched sibling) transplants in leukemia.

Ranier Storb, M.D., of the Hutchinson Cancer Center, described early efforts to treat severe aplastic anemia in identical twins with bone marrow transplantation. Aplastic anemia is a disorder of the blood-forming cells. About half the cases later required immunosuppression and a second transplant, suggesting that some aplastic anemia may be a type of autoimmune disorder.

Post transplant immunosuppression presents a major problem in all bone marrow transplant recipients. The patient's immune system is suppressed for six to twelve months after transplant. He or she is highly vulnerable to infection. Major transplant centers, like the one at Rush, have special air filtration systems, and take great care to protect the patient from infection. Yet still it occurs and can kill.

One factor contributing to this post-transplant state of immunosuppression is GVH disease. One way to avoid GVH disease is to use the patient's own marrow ("autologous"). Dr. Kaizer has done extensive work with autologous bone marrow transplants. "This effort is particularly important for the two-thirds of acute leukemia patients who lack an eligible donor," he said. Contamination of the marrow with residual tumor cells remains a problem, but Dr. Kaizer said several approaches promise a solution.

While combating cancer and aplastic anemia remain the most frequent uses for bone marrow transplant, the faculty also discussed its effectiveness in treating other blood disorders like thalassemia, an anemia seen in persons of Mediterranean heritage. Bone marrow transplant has also been used to correct certain genetic and metabolic disorders. Richard O'Reilly, M.D., Memorial-Sloan Kettering Cancer Institute, said these efforts may ultimately lead to a successful treatment for such fatal disorders as Tay-Sachs disease.

The faculty agreed that solving the problems of bone marrow transplantation requires a multidisciplinary approach. The Center at Rush includes pediatrics, internal medicine, hematology, immunology, oncology, therapeutic radiology, clinical nutrition, social services and medical nursing.

"We hope that the union of (different specialists) made possible by the development of our Center will provide the critical mass required for significant contributions to the solution of the problems of marrow transplantation," said Dr. Kaizer, "and that it will provide clinical programs at the cutting edge of the art to patients in the Chicago area."

Responding To Health Care "Buyer's Market"

by Henry P. Russe, M.D.
vice president, medical affairs
Rush-Presbyterian-St. Luke's
Medical Center

Reprinted from the January, 1985 issue of Commerce Magazine

Consumers of health care are shopping around more than ever before; therefore, hospitals and other health care providers must design new initiatives to make their services more widely available, not merely repackaging but carefully crafting responses to community needs. This article describes new health care initiatives at one Chicago Hospital.

In today's prevailing mood of cost containment, the climate for the purchase of health care—whether by government, private employer, prepaid health plan, commercial insurance, or some variant of these—can aptly be characterized as a buyer's market, with consumers of health care shopping around even more than ever before, continuing for the most part to make their decisions based on quality of product and price. Hospitals and other health care providers must design new initiatives to make their services more widely available, not merely repackaging but carefully crafting responses to community needs.

The major premises upon which new health care initiatives at Rush-Presbyterian-St. Luke's Medical Center are based are as follows:

- The integrity of our academic health center will be maintained.
- Not all care needs to be provided in a hospital setting; the extension of ambulatory care programs throughout the metropolitan area will bring health care services directly to people in the communities where they work and/or live.
- Employers will become more directly involved as the buyers of health care and the monitors of its outcome.
- Cost efficiency will have to be real, measurable, and demonstrable to employers and employees; quality care is, of course, assumed.
- Any health care system that wants to maintain its position as a major supplier in a competitive market must be prepared to offer a broad mix of programs and payment options that respond to the diversity of health problems and payment mechanisms. A comprehensive system can bring together the medical and management resources to offer such packages.
- Decisions about where to hospitalize patients must take into account the patient's needs and the commitment to employers to hold costs down. Wherever appropriate, (e.g., level of severity of illness, geography, costs) patients do not have to be hospitalized at Rush-Presbyterian-St. Luke's Medical Center but would be referred to other hospitals.

The new initiatives at Rush build upon an existing framework that has programs in place at some 30 locations throughout the Chicago area. These include Presbyterian-St. Luke's Hospital, the hub and major referral hospital of the Rush System for Health; a geriatric rehabilitation hospital, also on campus; a community hospital on the North Side; 15 widely dispersed offices of the ANCHOR health maintenance organization (HMO); professional office buildings for physicians on campus, on the North Side, and in River Forest; four occupational health centers on the West/Northwest city/suburban axis; a new corporate health center in the new office building One Financial Place in the South Loop; two offices of the Rush Home Health Service; and contract health care programs with both industrial and insurance clients.

The Rush strategy has been to (1) establish a presence at selected, geographically convenient sites throughout the Chicago area and (2) fashion programs based on the needs of industry and communities in those areas. The expectation is that expanded ambulatory care activity, together with programs offering employers a variety of options that integrate preventive medical care and cost-effective utilization of health services, will have a positive impact on the cost of health care services.

Just what benefits might employers expect? Employee health services, including preemployment examination, monitoring of employee health through periodic examinations and health counseling, return-to-work examinations, and diagnosis, treatment, and follow-up care for work-related injuries, all contribute to better care for employees and lower health costs. Other programs offering health education and health promotion, employee assistance services (for those with problems of alcoholism, chemical dependency, mental illness, family or marital problems), and hospital utilization management also can mean important savings. The latter is particularly significant as a means of containing costs and is an area where professionals in the health field can offer a distinct "home court" advantage to employers.

Hospital utilization management answers such questions as the following: Is this hospitalization really necessary? Are there other, less expensive options providing the same necessary health services? What length of stay is really necessary? What is the recommended recovery period? Does this hospital bill reflect actual services rendered? Through preadmission evaluation, including second opinions, of elective hospital admissions for employees and dependents, and by monitoring and evaluating the course of hospital patients on behalf of both the employee and the employer, agreements to manage hospital utilization can provide assurances to employers that their employees are getting all they are entitled to at reasonable cost.

Rush is now offering all of the services described here to several major firms and through the corporate health center in One Financial Place. It will offer similar programs to more than 800 companies served by the ANCHOR HMO and to the 2,000-plus firms, with employees numbering from 10 to 4,500, that use the industrial clinics for more limited services.

Rush is also developing a Preferred Provider Organization (PPO). On behalf of employers as well as individuals, the Rush PPO will contract with hospitals and physicians throughout the Chicago metropolitan area to care for patients at negotiated prices on a per capita basis. Employers and others who contract with the Rush PPO will, in turn, be assured that lower costs are passed on. The quality of patient care and efficiency of the PPO will be assured by rigorous adherence to accepted utilization management procedures.

Another form of organization, the Independent Practice Association (IPA) is also being studied at Rush. In an IPA, physicians in private practice subcontract to serve patients sent to them by an HMO, at agreed upon rates. In using private, fee-for-service practitioners, IPAs differ from staff-model HMOs, such as ANCHOR, which have a full-time salaried staff. The IPA model takes advantage of existing offices and can provide greater geographic coverage.

All of our ambulatory care programs provide flexibility by putting patients in touch with Rush-approved physicians as a part of the variety of services and programs made available to employers through these new initiatives.

Earlier in the article, it was stated that quality care is to be assumed in the total Rush effort. A further word might be added. No issue has given rise to more expressions of concern by the trustees, management and medical staff at Rush-Presbyterian-St. Luke's than the possible compromising of our standards to the exigencies of the marketplace. Fortunately, we do not have to respond to these concerns with reaffirmations of commitment alone. Despite a general downturn in patient care statistics for the metropolitan area for the past year, we again served a record number of patients at Rush-Presbyterian-St. Luke's. ⓡ

Opposite page: This ad, which appeared in Commerce Magazine, pinpoints geographic distribution of Medical Center resources.

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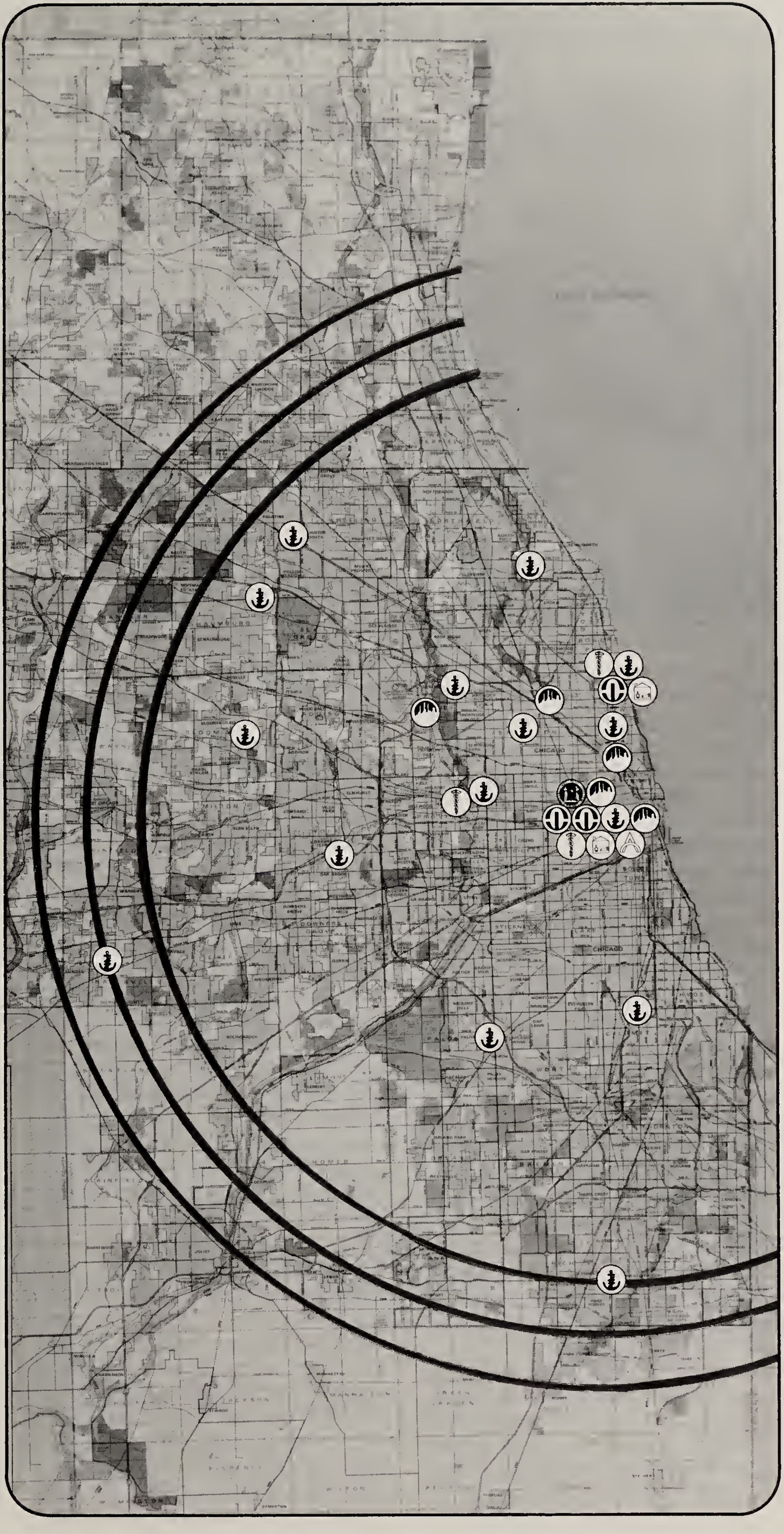
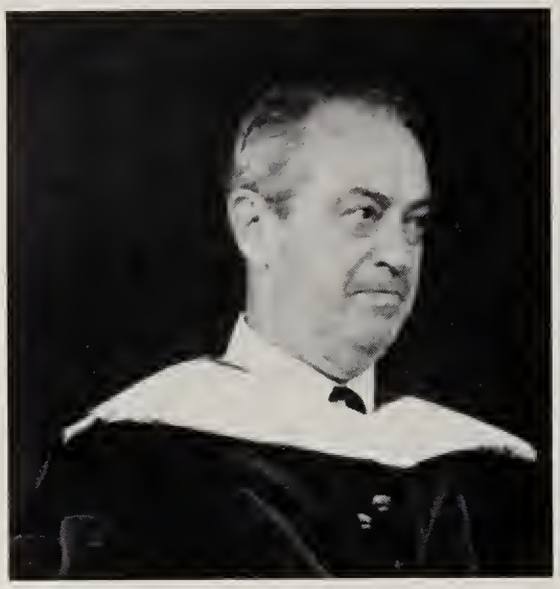


Health Education: A Spur to Health Research

Selections from the Commencement Address

By Julius R. Krevans, M.D.
Chancellor
University of California,
San Francisco



Julius R. Krevans, M.D., is chancellor of the University of California, San Francisco. Previously, he served as dean of the university's medical school, developing programs which made that school preeminent in teaching, research and clinical care. He was the 1983 recipient of the Abraham Flexner Award of the Association of American Medical Colleges, which recognizes distinguished service to medical education.

Dr. Krevans earned his bachelor's and medical degrees at New York University. He began his career as a fellow in hematology at Johns Hopkins School of Medicine, ultimately serving as dean for academic affairs at that institution. While at Johns Hopkins he was active as a researcher and director of the Blood Bank and made significant contributions to the field of hematology including serving with a group that developed the immunization procedure for Rh negative mothers.

Dr. Krevan's professional contributions have merited many honors over the years. At the June, 1984, commencement of Rush University he was presented with the honorary degree of Doctor of Humane Letters.

Your university is an unusual one. Its educational programs are in the health sciences, nursing, medicine, and the Ph.D. degrees. These programs address issues which involve the health of human beings, the care of the sick, the prevention of disease, and the promotion of health. You are a health university. We often respond to questions about the mission of a health university by using the analogy of the "three-legged stool"—teaching, research and public service, which in our case is patient care.

Let me illustrate the role of the health university in meeting its challenges by using the experiences in which I personally shared in Baltimore and in San Francisco. (Although I hope no one carries away the implication that nothing of value happens in that vast area that separates those two cities.)

In 1962, Ronald Finn, a young British internist, came to The Johns Hopkins University School of Medicine as a fellow in genetics. For the previous two years, he had been working on a novel approach to prevent Rh disease in infants. The work was begun in Liverpool where he had been assigned the task of writing a thesis as part of the educational requirements of his postdoctoral training. Since the head of his department was a geneticist, he diplomatically chose a genetic subject, even though his interests were in renal disease. His thesis was that the immunization of the Rh-negative mother, the cause of the Rh disease in subsequent infants, could be prevented by injecting an anti-Rh antibody immediately following the delivery of an Rh-positive baby. The theory was based on insightful epidemiological observations concerning that disease.

When Finn came to Baltimore I was asked to take him into my laboratory. Although my own research was in blood platelet transfusion problems and anemias, part of my teaching responsibilities was in human genetics. The work was started in a spare room of the Johns Hopkins blood bank, of which I was then director, and later moved to the Maryland penitentiary. Eventually, it was successful. Quite independently, scientists at Columbia University were pursuing similar ideas. The success of the two groups is now part of standard medical practice.

In this example, displaying the tightly woven web of education, research and clinical innovation, the role of the teaching hospital was crucial. Your university in a sense was reborn out of its relationship to a teaching hospital. Finn was required to develop a research thesis as part of his educational program. He pursued his education in medical genetics, and ended up in my laboratory because of my educational assignment. The hospital laboratory provided a base for his research and it provided resources. When preliminary studies on volunteers were completed, the first trials were begun in teaching hospitals in Baltimore, New York and Liverpool. The final result was a major clinical innovation of the most desirable sort, the prevention of a dreadful disease. Now research doesn't always go so quickly and successfully. This work was begun in the early 1960s, and preventive therapy was available by the end of that decade.

Let me give another example of research which has taken longer and is still not entirely resolved. Respiratory distress in the newborn has been, by far, the most common cause of death of the newborn in the United States. Until

"It is clear that the setting of education has a positive effect on research and, in turn, research leads to improvement in the health of our society."

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recently, each year in the United States approximately 50,000 infants were born with this disease and over half of them died. Because of basic research, the extension of that basic research to clinical research, and the application of the knowledge gained, mortality has been reduced to the range of five to six percent, thus saving, each year, more than 20,000 lives of babies in the United States alone.

This story begins in the 1950s when a man named John Clements became interested in exploring the fundamental phenomena which determined lung elasticity. His work and the work of Avery and Mead led to an understanding of the unique role of a product excreted by the lining of the cells of the lung, called surfactant, a kind of biological soap which maintains the normal function of the little air bubbles which are the working units of our lungs. Clements' early studies determined the origin of pulmonary surfactant, its dysfunction and, most important, those factors which influenced its presence or absence. In 1959, Drs. Avery and Mead showed that the surfactant was absent in premature infants and related to newborn respiratory distress syndrome.

Based on the observations of Clements, Avery and others, Drs. Gregory, Phibbs, Tooley and Hamilton, on the faculty of the University of California, San Francisco, undertook studies to vary the way we support ventilation in infants who were in distress. Their results revolutionized the management of premature infants and became one of the cornerstones of what we now call neonatal intensive care. Prior to this, eleven percent of infants weighing between 1,000 and 1,500 grams survived. Today, over 90 percent of this same group survive.

Dr. Gregory and his colleagues were all clinicians on our full-time faculty, in the departments of anesthesia and pediatrics, with major responsibility for patient care, teaching and research. It is no matter of chance that they took the principles that Clements, a professor of physiology in San Francisco, and others had demonstrated, added their own insights and experience and changed mortality of a common disorder. These clinicians were part of the staff of a health university. They felt secure that their responsibilities did not end with providing the best care possible. Indeed, their responsibilities would not have been discharged had they failed to pursue this research.

What draws these examples together is the concept of a health university. Those of us who are part of such a university have a common commitment to the care of the patient who is in the hospital today. We share this commitment with other hospitals. In addition, through education and research we discharge our commitment to the patients of tomorrow. The work on the Rh factor first led to the prevention of a disease. Not a single new scientific fact was needed. Ehrlich, early in 1906, performed the experiments which formed the basis for the success of the Rh prevention, but it was the education setting in a research environment with the resources and the responsibility of a health university which made its success possible. The other example is more orderly: the search for fundamental physiological information about the lungs added to our knowledge; in turn, this allowed us to make a successful intervention. Thus, it is clear that the setting of education has a positive effect on research and, in turn, research leads to improvement in the health of our society.

What about the other side of the coin? Is research harming health education? Let me assure you this is not true. But, is there an antipathetic relationship between scientific thinking and compassion? Ivan Illich, probably more than anyone else, popularized this notion. In his book, "Medical Nemesis," (which, like the Flexner Report, is more widely quoted than read), a major point is that "scientificology," the increased worship of technology, destroys compassion. I feel firmly and strongly that this is well-written nonsense. For the health profession the most grievous sin is to be ignorant of the science which would allow that profession to provide the patient the help that patient needs. There is no need to make a choice between science and compassion. The patient needs both.

At the last meeting of the Association of American Medical Colleges, Professor Michael Bishop, of the University of California, San Francisco, discussed this debate about science and compassion in relation to medical education. He said: "I have a non-negotiable final position in this debate. When I fall ill I want a disciplined intellect at my bedside. I care less for how gently she or he may lay on hands. I have less need for an ointment than I have for the disciplined use of knowledge for well-formed judgment. Empathy gives me little comfort in the face of the devious puzzles nature can throw at the physician."

Bishop also quoted David Horrigan, author of a response to "Medical Nemesis," as follows: "The purpose of science and medicine is to attempt to get at the truth.

Why should falsehood and ignorance be warm while truth and knowledge should be cold? Only more and better science will perform the humane function of eliminating the errors encouraged by warm emotion." Bishop concluded that "the contrary view that science and medicine are antipathetic to humanism is simple poppycock, so widely held among students of my acquaintance as to reduce me to tears. Science strengthens the physician's hand in the very act of talking with the patient. The human practice of medicine requires that the patient be given a full and nonpatronizing explanation of what is happening and what the options might be. To do this, the physician (here Professor Bishop was talking about medical education, but this is true of the nurse or any other member of the healing professions) needs knowledge, critical judgment and restraint, qualities all inherent in the pursuit of science. I refuse to blame the intellect for crassness. Science does not make the physician unfeeling."

Should we, however, confine ourselves in scientific research or teaching to those subjects which are relevant, with relevance described as that science which has an immediate, practical application in dealing with problems of health? What a travesty that would be! Julius Comroe, who has written the exciting subject of research into research in a wonderful set of essays called *The Retrospectroscope: Insight into Medical Discovery,* said, in the lead essay entitled "What makes the Sky Blue?":

"Charles E. Wilson, the former president of General Motors, President Eisenhower's Secretary of Defense, the determined opponent to basic research, will long be remembered by scientists for his classic phrase, 'I don't care what makes the grass green'. He might just as well have said, 'I don't care what makes the sky blue'. A scientist named Tyndall did care and in an ingenious set of experiments he showed that the reason the sky was blue was because the air around us contains particles. From those experiments on why the sky was blue came the destruction of what was then the prevalent theory in biology, spontaneous generation. There came proof of the defense mechanisms that are in our own airways against inhaled particles. There came quantitative tests of air pollution and even the physical principle which is the basis for the flexible bronchoscope."

Advances in the skills of health professionals come from increasing knowledge in the fundamental natural and behavioral sciences which affect human health. Your public services at Rush are the treatment of illness, prevention of disease and promotion of health. Your education and research programs are directed so that your successors' service programs will be better than yours.

Finally, a few personal words to the graduates. Today you are basically taking a vow that the public has some right to expect from you certain levels of performance, whether it be in the personal provision of services to sick people, in teaching, or in research. You have the responsibility to maintain your own capacity to not disappoint that public.

I learned this lesson in a very extraordinary way when I had just started my internship. Leaving the hospital about two one morning, I passed by the orthopedic floor. The light was on in the ward and there was an enormous commotion going on. An elderly Italian woman who had been in a bad automobile accident had just come out of anesthesia. I didn't understand Italian, but I could tell she was cursing and thrashing about and people were trying to quiet her down. Suddenly she looked over and saw me standing in the light and recognized me as a doctor. She took a big breath, breathed a big sigh of relief and said, "the doctor." I walked over, she stopped thrashing around, the nurse told me what to do and what to say, and everything worked out fine. When I got back to my room I suddenly realized the enormity of what had just happened. A perfect stranger, who did not know me, recognized that I was someone from whom she felt that help could come. The enormity of that responsibility resting on me for the rest of my life gave me some very serious thoughts for the future. Ⓡ

RushRounds

Elect Three Trustees, New Vice Chairman

Three new trustees and an additional vice chairman have been elected to the Board of Trustees of Rush-Presbyterian-St. Luke's Medical Center. The new Trustees are David W. Grainger, John P. Keller and Joseph J. Muenster, M.D. Marshall Field was elected a vice chairman.

At the annual meeting last fall, Harold Byron Smith, Jr., was re-elected chairman, and Roger E. Anderson, Richard M. Morrow and Richard L. Thomas were re-elected vice chairmen. Leo M. Henikoff, M.D., also was re-elected president of the Medical Center. Smith is chairman of the executive committee, Illinois Tool Works, Inc.; Anderson is former chairman and director of Continential Illinois National Bank and Trust Company of Chicago, Continential Illinois Corporation; Morrow is president of Standard Oil Company (Indiana); and Thomas is president and director of First Chicago Corporation, The First National Bank of Chicago. Marshall Field, the newly elected vice chairman, is chairman of the board, The Field Corporation, and chairman of Cabot, Cabot & Forbes Company.

In other action at the annual meeting, David W. Dangler was elected a Life Trustee.

Mr. Grainger is chairman of the board and a director of W. W. Grainger, Inc., a nationwide distributor of electric motors for home, farm and industry. Mr. Grainger graduated from the University of Wisconsin in 1950 with a bachelor of science degree in electrical engineering. He joined the company in 1958 and became its chairman in 1968.

Marshall Field

David W. Grainger

John P. Keller

Joseph J. Muenster, M.D.

Mr. Keller is president of Keller Steel Company, with headquarters in Northfield, Illinois. Prior to being named president of Keller in 1973, Mr. Keller was the business manager for *Time* magazine; in 1970, he became president of Pioneer Press, the newspaper subsidiary of Time, Inc. A 1961 graduate of Yale University with a bachelor of science degree, Mr. Keller also holds an M.B.A. degree from Harvard University.

Dr. Muenster is professor and senior attending physician in the Department of Internal Medicine at the Medical Center and a past president of the medical staff. A noted cardiologist, he received his M.D. degree from St. Louis University.

Mr. Dangler, first elected a Trustee in 1969, is a former vice president of the Northern Trust Company, and the current president of the Johnston R. Bowman Health Center for the Elderly. He holds a bachelor of arts degree from Yale University. P.C.

Research Park Aids High-Tech Development

Rush-Presbyterian-St. Luke's Medical Center and the University of Illinois have formed a not-for-profit corporation to operate a new 44-acre technology park now being developed in Chicago's west side medical center. Chicago Technology Park will provide an array of facilities and services to encourage the development and expansion of research teams, engineering companies and other businesses specializing in high technology and biotechnology.

The establishment of this complex has been a long-term goal of both the State of Illinois and the City of Chicago. The park is being financed primarily with $9.5 million in state funds, with another $2.5 million for improvements from the City of Chicago. The Medical Center and the University of Illinois were invited to participate in the planning and operation of the site by state officials because of the proximity of these institutions to the park and their large concentration of health care facilities and services.

The hub of the new Park will be a three-story "incubator" building with laboratory where new ideas and products can be "hatched." Groundbreaking for the incubator facility is scheduled for 1985.

According to the state plan, the incubator facility will contain smaller companies in the beginning stages of operation as well as more established firms already developing and marketing their products. Eight million dollars has been allocated for the building's construction. The remaining $1.5 million dollars from the state is earmarked for land acquisition by the Medical Center Commission within the Park area.

The Park's first tenant was Cell Analysis Systems, Inc., which moved into an existing structure last November. James W. Bacus, Ph.D., professor of medicine and director of the Medical Automation Research Unit at Rush-Presbyterian-St. Luke's Medical Center, heads the firm. Cell Analysis Systems, Inc., specializes in machine vision and artificial intelligence applied to medical problems.

In August of last year, Amgen, a California-based biological engineering company, broke ground for its 40,000-square-foot building, the first to be constructed in the Park. Amgen expects the building to be completed by the end of 1985 for production of human and animal health care products, including interferons for human viral infections and cancer.

As the park develops, teams of scientists working on research with the potential of producing products for the biotechnology industry are expected to rent space in the incubator building.

It is anticipated that the park tenants will take advantage of the myriad of resources available from the Rush-Presbyterian-St. Luke's Medical Center and University of Illinois corporation. These include use of the libraries and various computer capabilities. C.E.

At groundbreaking for Amgen facility: (l-r) W. Randolph Tucker, M.D., director, research administration, Rush-Presbyterian-St. Luke's Medical Center; Cancellor Donald N. Lanzenberg, University of Illinois, and Alderman Vito Marzullo.

Endowments Create New Professorships

Two new named professorships have been established in Rush University, the academic component of Rush-Presbyterian-St. Luke's Medical Center, bringing the total of named professorship within the University to 31. The professorships, endowed through gifts from family, friends, patients and colleagues, are: The William Gottschalk, M.D., professorship in anesthesiology and The Max Sadove, M.D., professorship in anesthesiology. The department of anesthesiology is the first in the University to have two new chairs created at the same time.

The late William Gottschalk, M.D., who died October 22, 1984, served as associate chairman of the Department of Anesthesiology. He was an internationally recognized authority in both anesthesiology and obstetrics and gynecology.

Dr. Gottschalk, who was born in Belgium, joined Rush-Presbyterian-St. Luke's in 1975, and held professorships in two departments in Rush Medical College and another in the College of Nursing. He was widely published and, in the past 15 years, had served on more than 200 committees in professional organizations.

"Dr. Gottschalk epitomized the Rush physician-teacher," said Leo M. Henikoff, M.D., president of the Medical Center, in announcing the professorship.

Dr. Sadove, now emeritus, served as chairman of the Department of Anesthesiology from 1971 to 1979 and remains active in research in the field. Before coming to Rush as chairman in 1971, he served as chairman of the department of anesthesiology at the University of Illinois for 21 years.

"He was a national figure in his field and brought that distinction to us," Dr. Henikoff said. "He gave of himself unstintingly. He set up a program of scientific inquiry into the relief of pain. In publications and presentations, he taught and inspired."

The specialty of anesthesiology deals with one of the most complex areas of human experience—the management of pain. It is among the oldest departments at Rush, dating back to 1947 at Presbyterian Hospital when its first chairman was Charles D. Anderson, M.D. However, the first physician-anesthesiologist at that institution was Isabella Herb, M.D., who came in 1925. Today, under the chairmanship of Anthony D. Ivankovich, M.D., there are 24 physicians on the staff and faculty and another 25 physicians associated with the department through affiliated hospitals. In addition, four full-time Ph.D.s are working on departmental research. There are 25 physicians in residency and about a third of the Rush Medical College graduating class chooses a four-to-six week elective in anesthesiology. This departmental staff is involved in 23,000 clinical activities each year, including 16,000

(L-R) Max S. Sadove, M.D., former chairman, Department of Anesthesiology, for whom new professorship was named, with Leo M. Henikoff, M.D., president, Rush-Presbyterian-St. Luke's Medical Center, and Anthony D. Ivankovich, M.D., chairman, Department of Anesthesiology.

operating room procedures and 2,000 patient visits to the Pain Center.

One of the existing named endowed chairs in Rush University honors J. Bailey Carter, M.D., a pioneer researcher in anesthesiology, although his specialty was cardiology. He participated in the discovery of ethylene gas which was more effective and had fewer side effects than either laughing gas or ether. He was the first human subject on whom the new anthesthetic was tested in 1922.

Begin Pilot Project In Early Admission

Mary wants to be a doctor. She's sure of it.

A freshman in college, she's proven to be a good student, maintaining nearly an A average overall. She's particularly pleased that she did so well in both the chemistry and calculus courses required as part of her pre-med studies. Mary shows a maturity not so common in one who has yet to celebrate a nineteenth birthday. She's determined to succeed and willing to work hard.

Competition will be stiff. Nationwide last year, for example, there were more than twice as many applicants as positions available for the first year in medical school. At Rush Medical College, where the entering class numbers 120, applicants totaled 2,500.

But now students like Mary may qualify for a "reserved" place at Rush.

A new early admissions program guarantees qualified college freshmen entry into Rush when they graduate with their bachelor's degrees.

The program has been initiated on a pilot basis with Knox College in Galesburg, Illinois, and Grinnell College in Grinnell, Iowa, both members of the Rush Academic Network (which includes 16 colleges and universities in six states).

Five freshmen from each college will be chosen each year. The application process includes interviews and essays, comparable to what the students would usually go through three years later as graduating seniors, according to Gerald S. Gotterer, M.D., Ph.D., associate dean, medical student programs, Rush Medical College.

"What we hope to do," Dr. Gotterer explains, "is alleviate those three years of stress when, some critics say, the uncertainty of getting into medical school creates an atmosphere so competitive that it interferes with broad intellectual growth."

With the assurance of a position in medical school, students in the early admission program can enjoy some flexibility and take advantage of educational opportunities that they might not under ordinary circumstances. Dr. Gotterer suggests that they might opt to take more liberal arts courses for their electives or spend some "free time" involved in an in-depth science research project.

Of course, they must still complete all the courses required in the pre-med curriculum with a grade of B or better. An overall B average is mandatory.

"We're looking for the superstars," Dr. Gotterer says. "Without a doubt, students in the program must be academically strong. But they must also demonstrate good character, a sense of responsibility and sound judgement. We want to be sure that they will be able to handle the rigors of medical school without necessarily coming through the competitive environment."

Plans are to study the impact of the early admissions program by comparing undergraduate experiences of those assured a place in medical school with pre-med students who apply during their senior year. According to Dr. Gotterer, "we're particularly interested in how the flexibility offered the early admissions students affects their commitment to their studies."

Only a few medical schools in the country offer an early admission option. Among them, Georgetown University School of Medicine has a program similar to the one at Rush and Brown University has initiated one for students graduating from high school. KK-K.

ChemStress Program Aids Substance Abusers

A newly restructured alcohol and drug abuse program, called ChemStress, has been launched at the Medical Center under the auspices of the Department of Psychiatry. Unlike traditional substance abuse programs which focus on inpatient rehabilitation, ChemStress emphasizes outpatient care and a variety of intense medical and psychosocial therapies.

The department, under the direction of Jan Fawcett, M.D., the Stanley G. Harris, Sr., professor and chairman, has long been recognized for its innovative treatment and research efforts for a variety of psychiatric disorders. For several years now, studies have been underway in the department to evaluate the efficacy of specific treatment for substance abuse and depressive disorders.

"Our studies have shown that one year after traditional inpatient treatment up to 60 percent of patients are drinking again," Dr. Fawcett says. "Alcohol/drug abussers are at greatest risk for relapse during the six months following initial treatment. It struck me that during this time we should intervene in the process, not just by detoxifying the patient, but by having a comprehensive medical and psychiatric approach which strives to prevent relapse."

Studies are currently being conducted in the department on the use of lithium carbonate with patients who have previously relapsed. Initial results indicate that 65 percent of patients who maintain therapeutic levels of lithium will be abstinent after one year of treatment.

"The application of new, specifically indicated therapies which are developed through clinical research is one example of what we mean by 'comprehensive' treatment approaches," Dr. Fawcett explains.

There is growing awareness, too, that the treatment of drug abuse is not that dissimilar to the treatment of alcohol abuse and that there is a growing population dependent both on alcohol and drugs—the polyabuser.

"Polyabusers are rapidly becoming our largest population in treatment programs," says Jeffrey M. Tilkin, M.D., medical director of ChemStress and of the inpatient Alcohol and Substance Abuse Programs at Rush-Presbyterian-St. Luke's Medical Center. "To date, inpatient treatment programs have been too restrictive, treating only alcoholics or drugs abusers, when, in fact, many of these people have multi-abuse problems.

"Polyabusers are more difficult to treat successfully because there is more than one problem involved," he explains. "These patients need the support of long-term therapy programs to remain abstinent."

To provide such long-term programs the ChemStress staff developed treatment systems or "levels of care" which individualize each patient's care to ensure that the treatment regimen is comprehensive enough and long enough. These treatment levels are based in large part on the results of studies linking substance abuse to depression, anxiety and other stress-related disorders. The staff which developed them includes psychiatrists, psychologists, registered nurses, substance abuse counselors and social workers, each with specialized expertise in treating the alcohol/drug-abuser and in developing alcohol and substance abuse programs.

ChemStress offers short-term hospitalization for detoxification, if necessary, psychotherapy and psychotropic drugs, as indicated. There are also traditional support services, such as Alcoholics Anonymous, Narcotics Anonymous and other group therapies. Treatment regimens are tailored to each patient's lifestyle, but usually include an initial evaluation and assessment, counseling, psychotherapy, access to community support groups, medication as needed for depression, anxiety or chronic pain, occupational stress evaluation, biofeedback, psychodrama and social services. The ChemStress staff works closely with the patient's physician to integrate the treatment plan with the patient's overall medical needs.

Patients who need to be hospitalized will be admitted to the inpatient unit of the Alcohol and Substance Abuse Programs at Sheridan Road Hospital or the Stress Disorders Unit at Presbyterian-St. Luke's Hospital. Dr. Fawcett predicts that less than 50 percent of patients admitted to ChemStress will need hospitalization, and those that are will likely stay no more than one week.

Outpatient care may occur four or five days a week during the first month. Visits decrease in frequency as the patient's coping ability improves. This outpatient approach eliminates the need for a transition back to work or home and reduces the likelihood of relapse.

Cost effectiveness is also built into each patient's ChemStress treatment program. Psychiatrist Phillip S. Epstein, M.D., a director of ChemStress and medical director of utilization management for the Medical Center, points out that the 1983 Blue Cross Probe Reports shows the average cost for hospitalization for alcohol treatment is $5,300. According to Dr. Epstein, cost-benefit analysis of the traditional treatment method—$5,300 per patient with only a 30 percent chance of success after one year—indicated that an alternative method of treatment was necessary to meet the cost containment efforts both in the health industry and public and private sectors and also to reduce the prevalence of one of the nation's most serious health problems. "We use quality assurance and utilization review processes to ensure that ChemStress patients are receiving quality, yet cost effective medical and psychiatric care," Dr. Epstein says.

In addition to treatment, ChemStress has ongoing, large scale research studies on alcoholism, substance abuse and stress disorders. One such study is a research demonstration project which will follow a group of ChemStress patients for a year to measure treatment outcomes and cost effectiveness. ChemStress staff will evaluate criteria including return to the workplace, maintenance of psychosocial functions, abstinence, recovery from depression, rehospitalization for drinking episodes and satisfaction with the treatment program.

"This demonstration project is part of the ChemStress team's commitment to research, education and the development of more effective intervention programs," Dr. Fawcett says.

"We think this alternative treatment system will be more successful and more cost-effective," he says, "because it recognizes the chronic nature of the problem and tackles it." M.A.R.

Medical Center Nurses Form New Organization

A professional nursing staff organization (PNS)—one of the first of its kind in the country—has been established at the Medical Center. It is intended to insure the provision of quality nursing care, to promote high professional standards among nursing practitioners, and to establish standards of clinical nursing practice and a system for monitoring nursing practice through peer review.

The new group—which has been under study for five years—is designed on the traditional organization of hospital medical staffs. Though there are several professional nursing staff organizations in existence in the United States, the Medical Center's is the first which deals exclusively with clinical issues.

"We believe that if nurses have more input into decisions made concerning quality in clinical issues, they can be more accountable for their patients in areas such as primary nursing," says Marcia Pencak, M.S.N., R.N., president of PNS.

The structure of PNS is composed of a series of advisory committees with members representing the various nursing units and departments. These committees provide a vehicle through which nurses can have input into decision making, give and seek information and collaborate with nurses from different patient care areas. Since they were organized, unit advisory committees have been working on a variety of projects, including: development of guidelines for using exempt time and documentation of exempt time; study of clinical research questions that can be implemented on the unit and discussion of ways to introduce ongoing peer review on the unit.

"The organization is not a replacement for nursing administration," Pencak stresses. "Management decision such as salary ranges and personnel codes will continue to be made by administration. We are concerned with the clinical issues of nursing. We share the medical staff's goal of providing quality patient care."

There are more than 1,500 R.N.s on staff at the Medical Center, 74.7 percent of whom have a bachelor of science degree or above.

D.W.

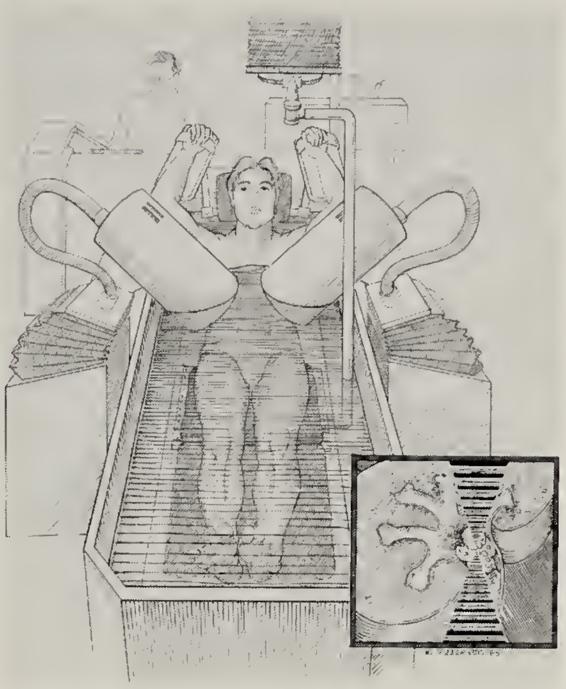
Nursing Staff officers (l-r) Lynne Braun, M.S.,. R.N., treasurer; Christine Kennelly, M.S.N., R.N., secretary; Marcia Pencak, M.S.N., R.N., president, and Sally McFolling, R.N., resident-elect.

Receive Approval for Lithotriptor

Rush-Presbyterian-St. Luke's is the first Chicago-area institution to receive approval from the Illinois Health Facilities Planning Board to purchase an Extracorporeal Shock-Wave Lithotriptor (ESWL). A lithotriptor (the name literally means "stone-crusher") dissolves kidney stones using shock waves, eliminating the need for surgery.

Says Charles F. McKiel, Jr., M.D., chairman, Department of Urology, "Removing kidney stones with a lithotriptor involves anesthesia and a short hospital stay, but there's no incision or operation, and it's back to work (or play) within a week."

The procedure involves the patient being sedated and immersed in a water bath; sound waves generated by the machine are directed at the kidney and pound each stone until it crumbles into pieces small enough to be excreted in urine. To the patient, the sound of the shock waves can be loud—described as being like repeated bangs on a garbage can lid close by—so typically the patient wears earphones through which music is played.



Artist's sketch of patient receiving treatment in lithotripter. (Inset: Shock waves bombard and pulverize kidney stones.)

The Food and Drug Administration granted approval for the machine to be sold in the United States in December, 1984. Federal officials believe the lithotriptor may replace many of the 100,000 operations done annually in the United States to remove kidney stones. As many as 80 to 90 percent of persons currently needing surgery to remove kidney stones may be candidates for the lithotriptor instead.

A study by the Health Planning Council for Greater Boston has estimated that using this device can save approximately $2,000 per case compared to surgery. Part of this saving is a reduction in hospital days, from one or two weeks with surgery, to four days or less with the shock wave device. In addition to the cost savings, the device can also mean less pain, inconvenience and recuperation time at home.

The lithotriptor may also help determine what causes kidney stones. "For about 70 percent of the kidney stone cases we see, we don't know why people get them," says Dr. McKiel. "Having a lithotriptor at an academic medical center like Rush will give us the opportunity to study large numbers of patients to try to determine what causes stones."

The ESWL will be purchased from Dornier Medical Systems, Inc., of Marietta, Georgia, the United States subsidiary of the West German company that developed the device, Dornier System GmbH. The $1.8 million machine should be installed at the Medical Center by the end of 1985 and will be operated under the direction of the Department of Urology.

Illinois Benedictine Affiliates With Rush

The establishment of a combined academic program in nursing with Illinois Benedictine College, Lisle, Illinois, increases Rush University's academic affiliations to 16 universities in six states. The agreement was announced by Richard Becker, Ph.D., president of Illinois Benedictine College and Leo M. Henikoff, M.D., president of the Medical Center.

The program leads to a bachelor of science degree with a nursing major. Illinois Benedictine will offer the basic science and general education components of the preprofessional nursing curriculum and Rush University will provide the professional curriculum during two subsequent years.

In a joint statement, the institutions announced that: "Illinois Benedictine is a liberal arts educational institution which can provide a preprofessional curriculum for students entering the health professions...Rush operates the College of Nursing which provides professional training in the health professions and seeks students with strong preprofessional training based in the liberal arts tradition. It is to the mutual benefit of Rush and Illinois Benedictine to plan, organize, and provide a cooperative educational program of quality."

Rush University, the academic component of the Medical Center, currently enrolls some 1,100 students in its four colleges—Rush Medical College, College of Nursing, College of Health Sciences and The Graduate College. In addition to the bachelor's degree, the College of Nursing offers the degrees of master of science in nursing and doctor of nursing science. At the most recent University commencement more the 200 nurses received degrees.

Illinois Benedictine, founded in 1887 as St. Procopius College, is an independent, college with 2,800 students enrolled in 28 undergraduate programs in education, humanities, science and social sciences. P. C.

New Emergency Center Phase One Completed

Recording an average of 36,000 patient visits a year, the emergency room at Rush-Presbyterian-St. Luke's Medical Center is one of the busiest in the city. Renovation and remodeling now under way, made possible by a grant from the Field Foundation of Illinois, Inc., will make it one of the most modern.

Phase one of the $1.2 million construction project, the clinical area, was completed in 1984. Now designated the Field Foundation Emergency Treatment Center, the new facility provides a central acute care area for all emergency cases. Previously there had been two separate emergency rooms (connected by a corridor), one for adults and another for pediatric patients.

"The consolidation affords more effective utilization," says Diane Howard, M.P.H., assistant vice president for administrative affairs. "It eliminates the need to duplicate equipment, supplies and staff, and enables us to maximize Medical Center resources."

According to Paul Hanashiro, M.D., medical director, Emergency Services, "the new facility will optimize the quality of patient care."

Total space remains about the same, but, with the remodeling, all treatment areas can now be seen and monitored from a central nursing station.

The most serious problems are managed in one of the three resuscitation rooms which have been located right next to the emergency entrance so they can be reached easily and quickly. They have been specifically designed for flexibility in handling all kinds of emergencies, Dr. Hanashiro explains, whether it be trauma due to multiple injuries, a case requiring immediate surgery or a severe medical or pediatric problem.

Presbyterian-St. Luke's is one of only a handful of hospitals in Chicago and neighboring suburbs with a special children's emergency treatment area that is staffed by pediatricians. The pediatric emergency rooms are part of the emergency center, located directly adjacent to its multi-purpose treatment areas, with easy access to the resuscitation rooms.

View of new Emergency Room, remodeled and expanded through gift from Field Foundation.

Phase two of the renovation project, which is scheduled to be completed in spring, 1985, includes a new registration and discharge area and waiting room. A new access from the ambulance ramp is also being constructed, as well as a triage area, decontamination/shower room and administrative offices. KK-K.

The Medical Center has a number of programs designed specifically for patients who are children or young adults. Some of these are described in the following series of articles.

Employees Share Meals With Pediatric Patients

It's nearly noon and there's the usual flurry of activity in getting ready for lunch. Some of the kids are hungry. A few don't feel much like eating, but they're eager to join the others at the table...

The scene is a familiar one in most homes at mealtime. What's different here is that the youngsters are pediatric patients at Presbyterian-St. Luke's Hospital. Instead of Mom and Dad, there are volunteers like Anna Bayers, Lou DiMauro and Mary Krembuszewski, all employees at the Medical Center.

Some 30 employees participate in the hospital's pediatric lunch program. Two are scheduled each day, Monday through Friday, to bring their brown bags and have lunch "family style" with the youngsters on 5 Murdock, a pediatric unit in Presbyterian-St. Luke's Hospital.

"The program is part of our ongoing effort to make the children's stay here as pleasant, comfortable and homelike as possible," says Jane Grady, M.A.T., director of the Child Life Program and of the Laurance Armour Day school, which provides child care and a kindergarten for youngsters of Medical Center employees.

Child life staff members had noticed that mealtime was a problem for some hospitalized children. They didn't eat well, and that's a particular concern, Grady explains, because poor nutrition could stand in the way of their recovery. Research has also shown, she points out, that when patients have meals in groups rather than alone, they tend to eat more and a better variety. So the pediatric lunch program was developed to encourage good eating habits and proper nutrition.

Staff members enjoy after-lunch game with pediatric patients as part of Presbyterian-St. Luke's Hospital's pediatric lunch program.

According to Loy Thomas, M.A., director of the Medical Center Volunteer Services Department, the program is unique for Chicago hospitals in that it is staffed primarily by employees. Using them as volunteers "turned out to be a very good idea," Thomas says. "They're enthusiastic, conscientious and have made the program quite a success."

DiMauro, a media circulation technician in The Chauncey and Marion Deering McCormick Learning Resource Center, has lunch with the young patients every other Thursday.

"I know there are a lot of parents who can't be with their children in the hospital all day; those that are might need a break and would probably like to get lunch too. This way they can slip out for a while and know that their kids are still getting individual attention." As a volunteer, DiMauro makes it a special point to spend time with those youngsters who have to remain in bed and can't join the others at the lunch table.

Bayers, who works in the Finance Department, enjoys being with the children. "I can see that the nurses and child life staff are really good to the kids, but even so it must be hard on the little ones to be in the hospital. I like helping out."

Employees in the program help children wash their hands, remove food from their trays and prepare the table for lunch. Some youngsters need help eating (even babies have joined the lunch table group) and others might need a little nudge to eat just one more bite. In a few minutes after settling at the table, the youngsters' initial shyness is usually gone and they chatter away about home, their brothers and sisters and friends, school and other interests. After eating there is always time left to play a quick game of "Candyland," sing a few verses of "Old MacDonald Had a Farm," or give Mr. Potato Head a new face.

"It's a nice way to spend lunchtime," says volunteer Krembuszewski, a member of the Purchasing Department staff. "It's not even a sacrifice; I'm sure I get more pleasure than I give."

According to Mary Jo Guglielmo, M.P.H., who coordinates the many child life programs at the hospital, "patient families have told us that the lunchtime program is great and they really appreciate the individualized care their children receive.

The children look forward to lunch with the volunteers and the employees go back to work with smiles on their faces." KK-K

Mark Tenth Year of Adolescent Family Center

Growing up is often hard to do, but the Adolescent Family Center of Rush-Presbyterian-St. Luke's Medical Center makes it a little easier for pregnant teens. The center, now celebrating its tenth year of service, is a comprehensive medical facility which provides prenatal and obstetrical care, family planning, social services and psychological counseling and support for young girls ages 12 to 18.

The center, a community-based resource for pregnant teens from the Greater Chicago area, is primarily supported by the Chicago Foundlings Home. A majority of the 250 girls served annually are from Chicago's West Side. Many are referred by their school counselors or social workers, or by friends who have gone through the center's program.

In carrying out its program, the Adolescent Family Center (AFC) has access to specialized medical care and receives additional support from Ambulatory Care Services and the Departments of Obstetrical/Gynecological Medicine and Nursing. According to Mary Brucker, R.N., unit leader and a certified nurse-midwife at the Center, the level of adolescent care has risen since the Center began. Says Brucker, "In the years before the opening of the center, pregnant teens from the west side were seen only in adult prenatal clinics. Now, our program includes delivery at Presbyterian-St. Luke's Hospital, postpartum and postnatal care, family planning, and physical and psycho-social services tailored for the adolescent."

Working with Brucker is a multidisciplinary staff of nine nurse-midwives, five social workers, two nutritionists, and a team of physicians, led by Howard T. Strassner, M.D., assistant professor, obstetrics/gynecology, and medical director of the Center. Dr. Strassner and other team physicians review each new client's history and serve as consultants to the nurse-midwives who handle the client's obstetrical and maternal care. In addition, graduate students in nurse-midwifery do their clinical practice and teaching at the center year-round.

When a pregnant teen comes to AFC, she first sees a nurse-midwife, nutritionist and a social worker. This two-hour visit includes a complete physical examination and a one-on-one discussion about general health, family, school, nutrition, and parenthood. Prenatal classes are arranged to supplement the one-on-one teaching and give each girl an opportunity to socialize and ask questions.

Throughout the educational experience at the center, each girl's family members, particularly her mother and the father of her child, are encouraged to participate. During this time, too, center staff works to meet the concerns about day care for the newborn, since many of the teens want to finish school. Although generally the infant is cared for by a number of the girl's "extended family," (grandmother, aunt, or older sister living in the home), social workers also help the teens to contact community agencies which offer day care facilities for teen mothers continuing in school.

Last year, about 250 babies were delivered at Presbyterian-St. Luke's Hospital by clients of the Adolescent Family Center. "Over the last three years we're seeing younger and younger girls," Brucker says. "While the average age is about 16 and a half, we have a high percentage of pregnancy in girls who are 14 years old and under." Brucker also points out that of the 13,000 babies born to teens in Chicago every year, more than 25 percent are born to those living on the west side, the area from which AFC draws most of its clients. Because of this, prevention is one of the center's priorities.

A family planning program, "Parents Too Soon," was begun in 1983. Funded by the State of Illinois, it provides family planning services and community outreach programs for sexually active adolescents, and social services for teens and their families.

Two social workers and one certified nurse-midwife staff the Parents Too Soon component of AFC.

In Adolescent Family Center: (from left) David Pate, M.A., Mary Brucker, R.N., and Susan Knight, ACSW.

Participants are teens who have never been pregnant, or whose pregnancies have not been part of the Adolescent Family Center program. They are given information and counseling on adolescent sexuality, responsible decision-making about sex and family planning. The social workers also speak to various community agencies and schools about these issues.

"A lot of our agenda is dictated by the needs of the community we serve," says social worker Susan Knight, ACSW. "This program was developed to prevent the cycle of teenage pregnancy from beginning, and to break it once begun (by preventing second pregnancies). I feel we can have an impact on the maturation process."

To supplement the Parents Too Soon Program, the Adolescent Family Center is beginning a new pregnancy prevention program directed at male teens. The program has been made possible through a grant from the Joyce Foundation. Social worker David Pate, M.A., has been added to the staff to concentrate exclusively on community outreach and to coordinate with other educational institutions on Chicago's west side. "Male teens are at least half the problem. Our program will help them make responsible decisions about their sexual behavior. As far as I know, this prevention program for males is a 'first' on the city's west side," says Knight.

Social worker Lee Karrow, ACSW, is analyzing information on all of the center's clients of the past year. The research focuses on the impact of adolescent pregnancy on the whole family structure. Of particular interest is the incidence of teenage pregnancy over several generations.

A second research study by Deanne Bereza, C.N.M., is examining the incidence of chlamydia among adolescents. Chlamydia, a microbe causing infection with symptoms similar to gonorrhea, is now the most common of the sexually-transmitted diseases. Because of the high incidence of the disease, each pregnant teen at the Adolescent Family Center receives a test for the infection, which can be damaging to newborn infants if undetected during pregnancy.

"There is a sense of progress and achievement here," says Brucker. "What we do has an impact not only on the girl's life and that of her baby, but also on the entire family." C.E.

Activities Help Ease Young Patients' Fears

For children, a hospital stay often provokes feelings of fear, uncertainty, and abandonment. Parents who can not stay with their child, either because of job responsibilities or other children at home, often experience the same feelings.

The Child Life Program at Rush-Presbyterian-St. Luke's Medical Center offers a number of activities designed to ease the fears of child and parents and to make the child's hospital stay as comfortable and homelike as possible. These activities are aimed at alleviating fear and anxieties and helping children cope with and master the hospital environment. They also help maintain and continue a child's developmental and motor skills.

"The regular activities we provide give a child something to do instead of being inactive in a hospital bed 24 hours a day," says Mary Jo Guglielmo, M.P.H., child life coordinator. "They also give the child a chance to interact with others."

For patients on the pediatric floors, the program schedules movies, trips to the Presbyterian-St. Luke's Hospital library for story hour and visits to learn about the Plato computer equipment in the Office of Computer Based Education, along with time to listen to music, play in the sandbox, or work on the wood shop work bench.

Older children in the adolescent/young adult units can enjoy movies, arts and crafts, rap sessions and working with computers. Once a week, they have the option of making their own lunch and going to the Medical Center cafeteria for dinner.

The program is staffed by three full-time and two part-time therapists, and by foster grandparents and volunteers who are trained to talk to children with minor problems. Every morning child life ther-

Mary Jo Guglielmo, M.Ph., child life coordinator, helps young patient learn about needles and shots through practice on obliging stuffed animal.

apists routinely check with the pediatric nurses to see if any child on the unit has special needs or problems. If any do, the therapist plans a special activity for them.

"One of our young patients was terrified of needles and blood tests," says Guglielmo. "As I was scheduled at that time for a blood test, I told the child I was a little frightened and asked if she would go with me. The little girl held my hand during the test, and assured me that it was for my own good and wouldn't hurt. By helping me go through my experience, she was able to overcome her own fear."

The therapists also receive referrals made by physicians about children hospitalized on units other than pediatrics.

One such case, Guglielmo recalls, was a 13-year old boy in the Bone Marrow Transplant Center who was not eating. "We arranged for him to cook breakfast for himself. He started eating again and eventually became the short order cook for the bone marrow unit staff."

The child life therapists work very closely with the interdisciplinary staff of the pediatric department—pediatricians, nurses, social workers, psychiatrists, physical therapists—often reinforcing therapy and familiarizing children with tests they must take.

In the Child Life playroom, there is a huge stuffed bear named "Teddy" on which the children use real medical equipment to draw "blood," insert I.V.'s, give shots and apply bandages. Through the generosity of the Medical Center's Woman's Board, a "patient puppet" will soon be available. This puppet has veins that will help therapist to illustrate the procedure involved in blood tests, a spine for showing how spinal taps are given, a partial wig for explaining the effects of chemotherapy, and sutures for demonstrating what happens in surgery.

A new activity, the pediatric lunch program, introduced recently by the Child Life Program in conjunction with the Volunteer Services department, was established to meet the problem of young patients who were not eating. (See article on page 53.)

An activity children can enjoy even after they leave the hospital is "Pres Press," a newspaper written by patients on the infant and children's and adolescent/young adult units. It includes pictures, games, puzzles and stories on hospital experiences. Children can continue to receive it at their home or school after their discharge and it provides an important continuity for those young patients who must be frequently hospitalized at the Medical Center.

The activities and programs of the Child Life Program are continually being shaped to fit the needs of particular child populations. The overall goal is to make a hospital stay as pleasant as possible.

D.W.

Medical Center Adopts Day Care Center

Rush-Presbyterian-St. Luke's Medical Center has adopted the Crane High School Day Care Center as one of its community projects. Crane High School, on Chicago's west side, is one of the largest of the city's public schools. The day care center is unique because it is located in the high school and is intended specifically to care for the children of teenage mothers who wish to finish their high school education.

"We decided to adopt the day care center because we not only could help the children, but their mothers as well," says Ava Salonis, community health education coordinator, Department of Community Affairs.

Services provided for the children, who range in age from three to five years, include: physical and dental examinations by Medical Center physicians and dentists; and educational and cultural outings and activities, such as—zoo trips, museum tours and puppet shows. The Medical Center also provides educational toys to reinforce health programs for the children.

The mothers of the children receive guidance in meal planning from Medical Center nutritionists and attend monthly health talks on child development, general hygiene, vaccinations, birth, contraception and child rearing. "Since these services have been offered the young mothers have become more responsible and protective of their children," says Flarizell Creagh, Crane's child development instructor and day care center manager, "One of our goals is to teach these young girls how to care for their children while they finish their high school education."

This goal is becoming a reality because of the assistance provided by the Medical Center.

And Crane's young parents and their children are not the only ones benefiting from the center. Students from Creagh's child development class who volunteer to help in the center receive class credit.

"Working in the center allows the student to learn first hand about child development. Hopefully, this experience will make them responsible parents in the future," says Creagh.

Creagh also notes that more young males are enrolling in her child development class. "One male student received custody of his son from the child's mother. He takes a very active role in the care of his child."

The day care center has been so successful that the hours have been extended from a half-day to a full day. The community's response has also been positive, resulting in gifts of food, clothing and toys.

"If it were not for the support of the Medical Center and its community affairs office, the day care center would not be successful," says Creagh. "These young kids can make something with their lives if given the chance. The Medical Center came along to give them that chance."

D.W.

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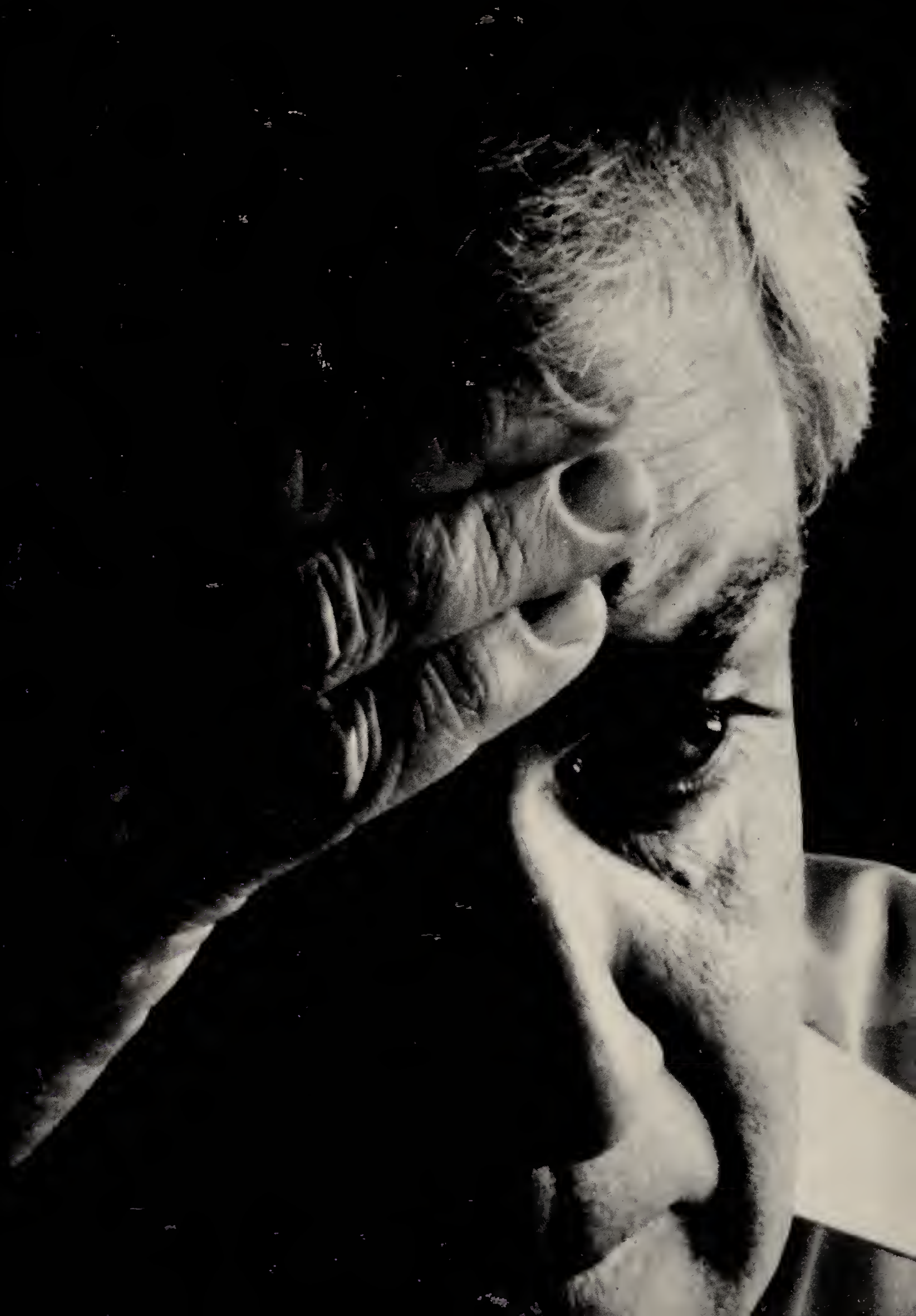

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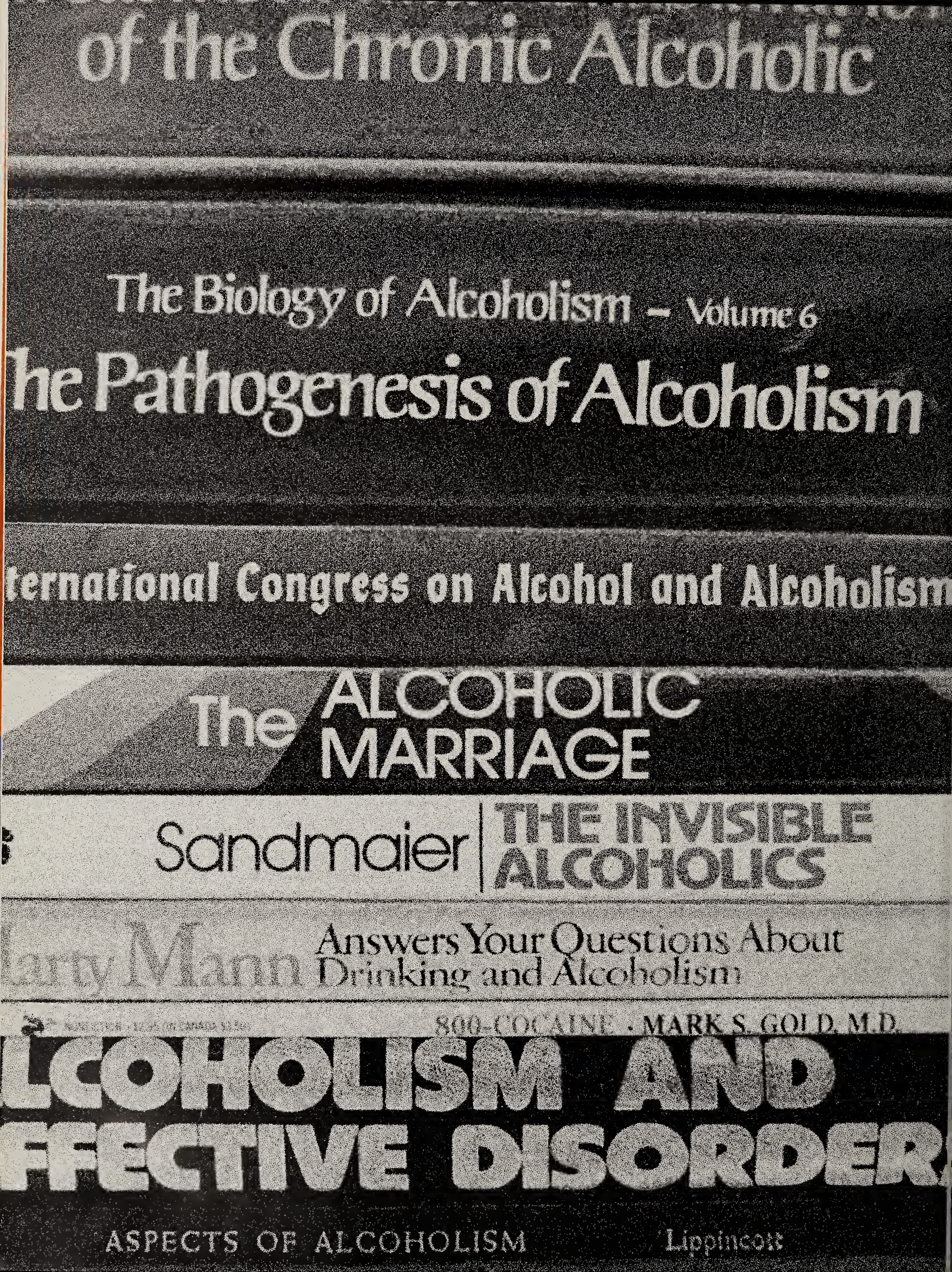
On the back cover: Computer image of a section of an alcoholic's brain, with circled areas indicating atrophy of gray matter. (Section of Radiation Physics)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ALCOHOLISM:

A Slow Descent Into Darkness

By Mary-Ann Redeker

"It (alcohol) sloweth age, it strengtheneth youth, it helpeth melancholie, it relisheth the heart, it lighteneth the mind, it quickeneth the spirit, it keepeth and preserveth the head from whirling, the eyes from dazzling, the tongue from lisping, the mouth from snaffling, the teeth from chattering, and the throat from rattling; it keepeth the stomach from wambling, the heart from swelling, the hands from shivering, the veins from crumbling, the bones from aching and the marrow from soaking." 13th century physician.

"Alcohol abuse is a serious health problem, probably one of the greatest in this country, affecting more than 14 million Americans. Alcoholism is a pervasive disease, socially analogous to a metastasizing cancer. It erodes the individual's physical and emotional conditions and quickly spreads to affect family, friends and co-workers." Jan Fawcett, M.D., the Stanley G. Harris, Sr., professor and chairman of psychiatry, 20th century physician.

Until recently, an alcoholic was viewed as a tattered skid row bum, slumped in a tenement doorway, clutching a bottle in a brown paper bag. We now know that alcoholics can be found not only in our cities' "Boweries" (which, ironically, contain only three to five percent of our alcoholics), but also in our boardrooms, school hallways, bridge clubs and nursing homes. With the advent of influential self-help groups like Alcoholics Anonymous and the growing realization among health care professionals and the general public that alcoholism is one of our country's biggest health problems, the image and treatment of the alcoholic began to change.

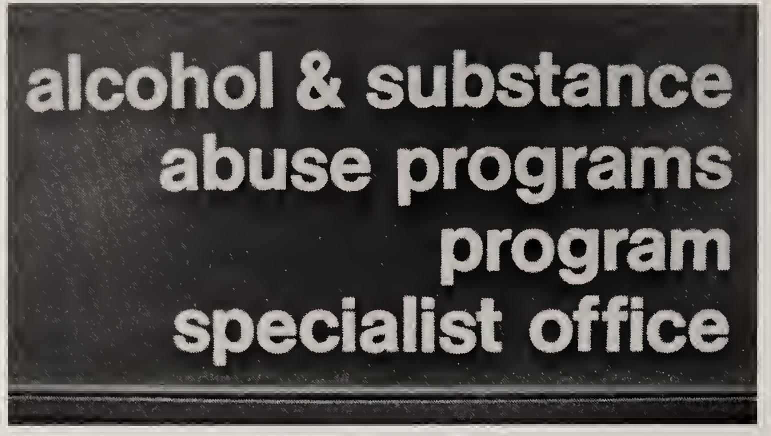
The American Medical Society defines alcoholism as a "chronic, progressive and potentially fatal disease...characterized by tolerance and physical dependency or pathological organ changes, or both—all direct or indirect consequences of the alcohol ingested."

For many decades, alcoholism was considered to be a moral problem and many alcoholics were taken care of by religious groups. This concept gradually changed and alcoholics, until recently, were considered weaklings, needing psychiatric care, or criminals and thrown in jail. Medical research disproved this notion and led the way to today's current thinking that alcoholism is a treatable disease, requiring, in many cases, care for the alcoholic's physical as well as emotional problems.

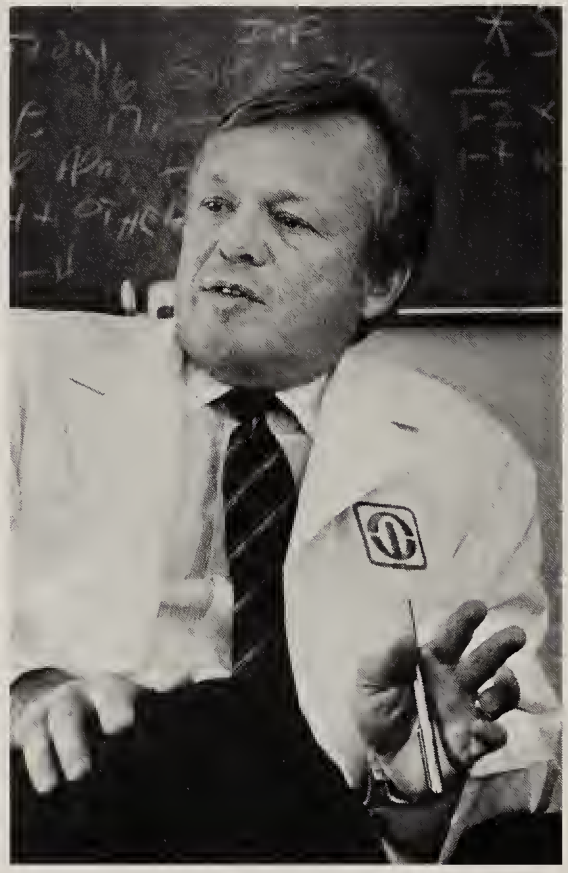
In 1966, the U.S. Court of Appeals agreed with this thinking, holding that alcoholism is involuntary and that persons who are "alcoholic" are patients with a disease, not criminals. The 1968 Alcoholic Rehabilitation Act reinforced this decision and, in 1969, Congress established the National Institute on Alcohol Abuse and Alcoholism.

Millions of dollars are now allocated to alcoholism research; employee assistance programs are available in many companies to help the alcoholic employee; and there are now more than 4,000 treatment programs in the United States.

"Alcoholism is a pervasive disease, socially analogous to a metastasizing cancer," says Jan Fawcett, M.D., the Stanley G. Harris, Sr., professor and chairman of psychiatry, Rush-Presbyterian-St. Luke's Medical Center. "The effects of alcoholism begin with the individual's



Jan Fawcett, M.D., the Stanley G. Harris, Sr., professor and chairman of psychiatry.



physical and mental states, but, as the disease progresses, it quickly affects family, friends, and coworkers."

Alcohol abuse exacts its price from body and mind. Physical manifestations can include liver disease, heartburn, vomiting and diarrhea, insomnia, elevated blood pressure and redness of the skin.

The depressive effects of alcohol cause a reversal of the evolutionary development of the central nervous system. Learning, memory, judgment, fine motor coordination and speech and hearing are the first affected. As abuse continues, integrations of voluntary movements, equilibrium and posture decrease and, finally, the cardiac, respiratory and vasomotor systems become affected.

This deterioration of the nervous system can lead to confusion, sensory deficits, seizures, anxiety and depression.

As alcohol abuse progresses, family, job and social problems multiply.

Industry realizes a $116.7 billion loss due to the direct and indirect effects of alcoholism. The majority of our highway deaths are caused by drunk drivers, many of whom are alcoholics. Many crimes in our country are committed by individuals under the influence of alcohol and drugs.

The toll continues—divorce, child and spouse abuse, suicide, rape, loss of job, property damage—each with its own set of grim statistics.

Current research tells us that all alcoholics are not the same, that to lump them into one grouping with the same physical and psychological traits is an error.

"Alcoholism can develop along one of two general pathways, although they are not mutually exclusive," says Vincent D. Pisani, Ph.D., assistant professor, psychiatry, and director, alcohol and substance abuse programs. "An individual may have a biologic or genetic disposition to alcoholism, which is why we have found that many times alcoholism runs in families."

Alcoholism can also develop along psychosocial lines. "Alcoholics in this track use alcohol as a secondary coping mechanism," Dr. Pisani explains. "As we grow up, we develop primary coping mechanisms such as rationalization, projection, denial and repression to handle problems in our lives."

The use of secondary coping mechanisms, such as drugs, alcohol and overeating, is learned later in life either at home from parents and relatives or from peers at school or on the job. Many people resort to secondary mechanisms to augment the effectiveness of the primary mechanisms.

"Alcohol is a popular choice because it's so accessible," Dr. Pisani says. "You don't need a prescription to buy it; advertising tells us that drinking is socially acceptable; and a drink is often used as a positive reward—after a promotion, as part of a celebration or party—or to help us through difficult periods in our lives."

Researchers have found that alcoholics can be early onset drinkers, those who begin drinking early in life, or late onset drinkers,

Vincent D. Pisani, Ph.D., assistant professor, psychiatry, and director, alcohol and substance abuse programs.

"Alcohol is a popular coping mechanism because it's so accessible."

Vincent D. Pisani, Ph.D.

Susan Vanderberg-Dent, M.D., discusses the diagnosis and treatment of alcoholism with Rush medical students.

those who start drinking later in life, even after retirement.

Alcoholics can also be classified as alcohol abusers (those functionally affected by alcohol) or alcohol dependents (those physically addicted to alcohol). "Alcoholics can be abusers without being physically dependent and vice versa," Dr. Fawcett says. Both conditions can also be found in an alcoholic.

Female alcoholics, elderly alcoholics and teenaged alcoholics are also coming under close scrutiny by health care professionals and researchers. It is this vast array of types of alcoholics that confront and confound the health care system daily.

What is being done to put this disease into remission?

"We're looking at this problem from all sides," Dr. Fawcett says. "Since it is becoming increasingly apparent that all alcoholics are not the same, but heterogenous groups, our research and treatment programs must be adapted accordingly."

Preparing Physicians for the Alcoholic Patients

More than 20 percent of all hospital patients are alcoholics. Many of these alcoholic patients travel through the health care system, receiving treatment for myriad illnesses, and emerging from the system still undiagnosed and untreated alcoholics. Recent studies have also shown that alcohol-related diseases account for 30 to 50 percent of all hospital admissions.

Project Cork, funded by the Kroc Foundation in 1981, was established at Rush Medical College and five other medical schools across the country to develop curricula to teach medical students and residents how to diagnose and treat alcoholics. This program continues at Rush, with modifications made over the years appropriate to the curriculum.

"Several problems confront the physician when dealing with a patient with an alcohol problem," says Susan Vanderberg-Dent, M.D., director of the family practice clerkship and assistant professor, Department of Family Practice.

One of the problems is sorting through the many symptoms alcoholic patients present to make a diagnosis. "One out of every five patients has a drinking problem," says Jeffrey M. Tilkin, M.D., assistant professor, psychiatry; medical director of ChemStress, the alcohol and substance abuse programs at the Medical Center; and a clerkship lecturer. "Physcians need to assume that their patients might have a drinking or drug problem until they can prove otherwise."

Telling a patient that he or she is an alcoholic is often a most difficult situation for the physician. "Confronting the patient with his or her disease and the need for treatment requires special skills," Dr. Vanderberg-Dent says. "This is why a major emphasis of the four-week clerkship in family practice is on how to identify and help the alcoholic patient."

Through lectures, articles, observation and question/answer sessions in Alcoholics Anonymous (AA) meetings, future physicians

learn how to diagnose, treat and counsel their alcoholic patients.

During his lecture to medical students in the family practice core clerkship, Dr. Tilkin discusses the medical treatment needed during the detoxification process and how to determine if the patient is an alcoholic. Material on how to confront the patient with his/her alcoholism problem is required reading and reinforces Dr. Tilkin's lecture.

The students also attend two AA meetings. "The AA group the students attend is composed of alcoholics who have a genuine interest in helping the students to understand alcoholism and in giving them suggestions as to how to work with their alcoholic patients," Dr. Vanderberg-Dent says. "Many alcoholics who have recently come out of a treatment program go through an 'I hate physicians' period where they blame their doctors for either misdiagnosing their problem for so long or for not confronting them with it earlier. This AA group believes that help for alcoholics comes from the early detection of the problem.

"The most important concept to come out of these AA meetings is when the AA members tell our future physicians—'yes, at first we hate you when you tell us we're alcoholics, but later on we're grateful that you confronted us with our problems'," Dr. Vanderberg-Dent says. "Future physicians need to hear that statement."

A recent trend in industry is to help, rather than fire, the troubled employee. Erwin Jefferson, coordinator, Medical Center's Employee Assistance Program, says both employer and employee benefit: the employee does not lose the job and by the time he/she resumes work full time, 75 percent of his/her productivity has returned.

The medical students also spend part of their time working with alcoholics in the treatment programs at Christ Hospital or MacNeal Memorial Hospital, two of the Medical Center's network hospitals. Dr. Vanderberg-Dent herself participated in an alcoholism treatment center rotation during her residency. "I found it to be extremely valuable," she says. "The experience not only taught me how to manage alcoholics medically during the first phases of treatment but also that most alcoholics are not skid row bums... alcoholics come from all walks of life. I think this is one of the most important facts the students can learn: that their patients don't have to look like bums to be alcoholic."

Monitoring student attitudes is part of the program. "We obtain pre- and post-clerkship assessments to see how the students' attitudes toward alcoholism and alcoholics have changed," she says. "For the most part, the students don't have negative attitudes at the beginning. They tend more to have a lack of knowledge about alcoholism. By the end, we're finding that they are much more accepting of alcoholism as a disease and have an increased awareness of what can be done to identify and treat it."

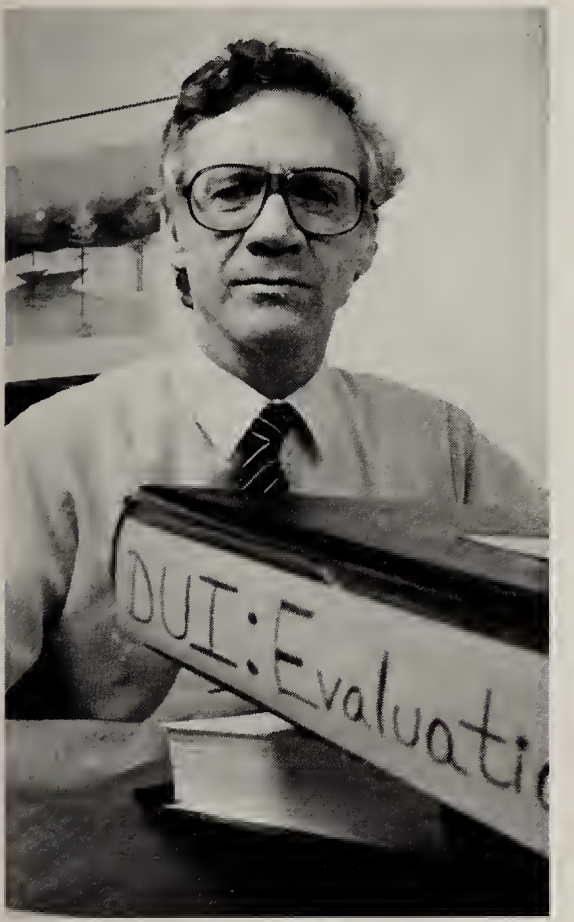
Screening for Alcoholism

One of the tools medical students and residents can use to help detect alcoholism is a test that has been used in a family practice setting by Rush researchers.

Deborah F. Hotch, Ph.D., assistant professor, family practice, and fellow researchers embarked on a study to examine the ease of implementation of the Michigan Alcoholism Screening Test (MAST) in an outpatient family practice center. The MAST, developed more than 15 years ago, has become one of the most widely used screening tests for alcoholism. "The MAST is not a diagnostic test but a screening test," Dr. Hotch says. "Much like a blood pressure screening test can be used to detect a potential problem, so the MAST can be used to cue the physician that the patient may have problems which need further evaluation."

Many studies have been done on the validity of the MAST screening test but little was known about the ease of implementation of the MAST as a self-administered questionnaire in a family practice setting. In general, MAST questions are often asked by physicians or other health professionals. "In a busy general medical clinic or practice, the MAST is more useful, both clinically and as a screening device, in the form of a fully self-administered questionnaire," Dr.

> *"One of the most important facts that medical students can learn is that their patients don't have to look like bums to be alcoholics."*
>
> **Susan Vanderberg-Dent, M.D.**



David Palmer, M.A., associate director, ChemStress, is a counselor who evaluates people arrested for drunk driving. The Medical Center is among several Chicago sites officially designated to perform DUI (driving under the influence) evaluations.

Hotch says. "Three studies had been performed by other institutions to test the use of the self-administered MAST in an outpatient setting, but these did not consider in detail the item-characteristics of the self-administered MAST."

Rush researchers conducted their study in a suburban Chicago family practice center. All center patients seen during an eight-week period who were 16 years or older, able to read English and physically able to complete the survey were eligible to participate. Patients were given a copy of the MAST with a cover letter explaining the nature of the study.

Of the 207 respondents, 160 (77 percent) answered all of the 37 items. Thirty respondents (18 percent) received positive scores which indicated possible problems with alcohol. "Of the 28 respondents who did not complete all of the MAST items, eight could be identified as probable problem drinkers based on their responses to items they chose to answer," Dr. Hotch says. "Several others did not drink and found several of the questions irrelevant to their situation.

"On the whole, we felt that the MAST can be successfully used as a self-administered questionnaire, if the physician includes an explanation that the person should complete the test whether he or she drinks or not," Dr. Hotch says.

Research Reinforces Treatment Approach

Nearly 200 years ago, one of our country's most distinguished physicians, Benjamin Rush, M.D., labeled alcohol abuse an "addiction and a disease." Unfortunately, treatment of this disease did not change with Dr. Rush's findings. Well into this century, alcoholics continued to be branded "sinners" or "criminals."

The current trend in treatment is to keep the problem drinker functioning in society, on the job and in a home setting, while receiving treatment.

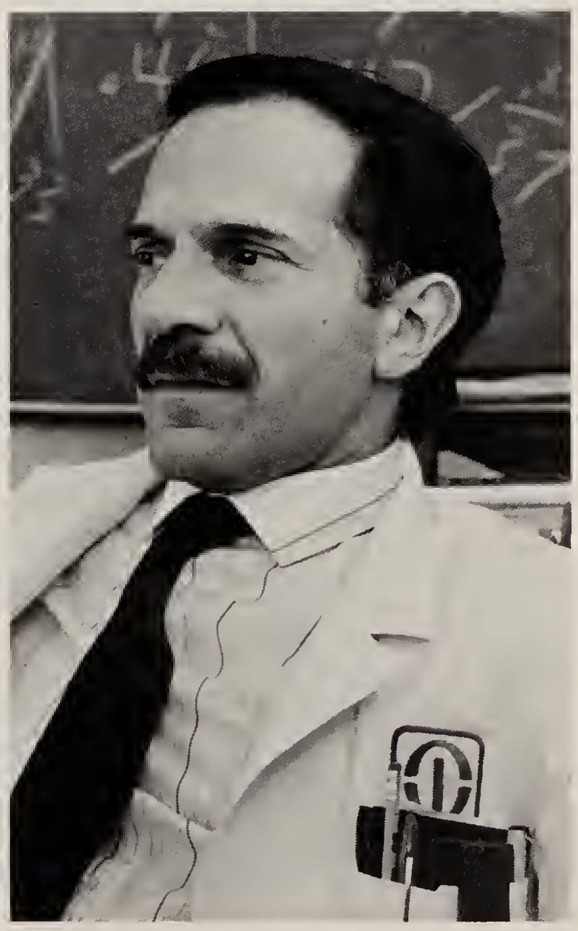
For several years now, the Medical Center's Department of Psychiatry, under the direction of Dr. Fawcett, has been studying the efficacy of specific treatment for substance abuse and depressive disorders.

One such study explored the use of lithium carbonate, a substance commonly used to treat manic-depressives, to prevent relapse in patients who were unable to remain abstinent.

Participants entered the study during inpatient treatment. Half of the 104 received lithium tablets daily, the other half, sugar pills which looked like lithium tablets. Participants' physical and emotional conditions were monitored over an 18-month period through the use of blood level tests, psychological testing and in-depth interviews.

"We started the study to test the effect of lithium on depression in alcoholics but found instead that it reduced their craving for alcohol," Dr. Fawcett explains.

While 65 percent of the alcoholics who maintained adequate lithium levels were abstinent one year



Phillip Epstein, M.D., assistant professor, psychiatry.

Linda Olson, M.O.T., O.T.R., assesses impairment through the use of puzzles.

after initial inpatient treatment, "over 60 percent of the alcoholics who did not take the lithium were drinking one year after treatment," according to Dr. Fawcett. Researchers coupled this observation with research findings coming out of studies at other institutions and discovered that alcohol/substance abusers are at greatest risk for relapse during the first six months following treatment.

They also found that about one-third of all the alcoholics in the study suffered from a major depression preceding their drinking. Another third developed a secondary depression after they began drinking heavily, while the remaining third were not affected by any major type of depression.

Patient histories also showed that in half the alcoholics in the study one parent was an alcoholic, and in 33 percent, one parent had experienced clinical depression, suggesting a familial vulnerability to both alcoholism and depression.

Although the study did not conclusively link alcoholism and depression, Dr. Fawcett feels that there is a common bond. "It struck me that during the first six months after initial treatment, we should intervene in the process, not just by detoxifying the alcoholic, but by having a comprehensive medical and psychiatric approach which responds to the underlying stressors—depression, anxiety—which could be contributing to an alcoholic's need to go back to drinking," he says.

Dr. Fawcett, working with Rush researchers and clinicians with experience and expertise in the diagnosis and treatment of alcohol and drug abuse, developed ChemStress, an advanced treatment system for alcohol/drug dependency and related stress disorders. "We restructured the existing alcohol and substance abuse programs at the Medical Center to focus on intense outpatient care and a variety of medical and psychosocial therapies," he says.

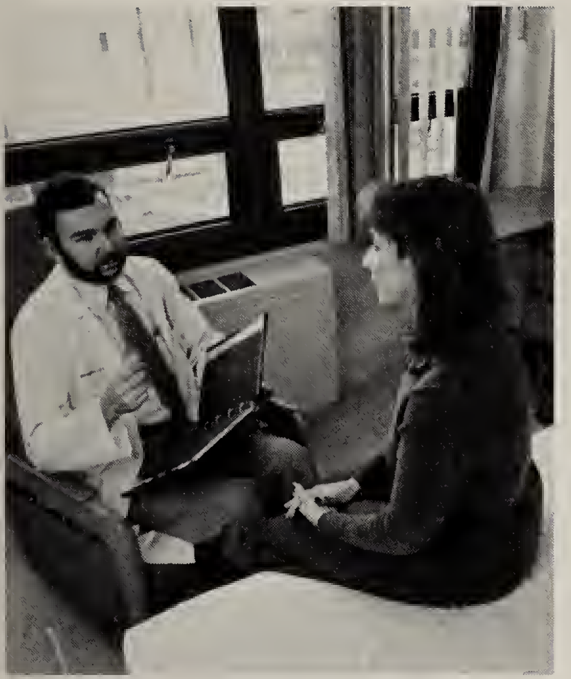
The treatment system consists of different levels which individualize each patient's care to ensure that the treatment program is extensive enough and long enough to treat the underlying stress disorders effectively, thereby preventing relapse.

While most of the ChemStress treatment program is conducted on an outpatient basis, inpatient hospitalization is available for detoxification, if necessary.

"Many alcoholics need to 'hit bot-

"…lithium carbonate…may help those who chronically relapse. It may be their only chance to remain abstinent."

Jan Fawcett, M.D.



Jeffrey M. Tilkin, M.D., consults with patient on the newly renovated inpatient treatment unit at Sheridan Road Hospital.

tom' before they acknowledge that they have a problem," Dr. Fawcett says. To reach 'the bottom' usually takes years, during which time the alcoholic's physical and emotional conditions deteriorate to the point that hospitalization is necessary, if only to fully evaluate the extent of physical problems and begin treatment and the detoxification process.

Alcoholics requiring hospitalization usually have severe medical and emotional problems, according to Marcella McGuire, R.N., S.C.A.C., head nurse, ChemStress inpatient program. "We try to stabilize their medical problems and provide a safe and comfortable environment in which to lay the groundwork for the need for continued treatment on an outpatient basis."

This groundwork includes participation in group sessions. As soon as the medical problems are under control, patients are assimilated into the groups on the unit where they learn more about alcoholism, its physical and emotional aspects, and about how this disease has affected not only their lives, but those around them. Group discussions also include the process of recovery, including what is relapse and why it happens.

One of the prime symptoms of alcoholism is denial. "It's hard to begin treatment when they don't think they have a problem," McGuire says. "Overcoming a major hurdle can be just getting alcoholics to admit they have a problem."

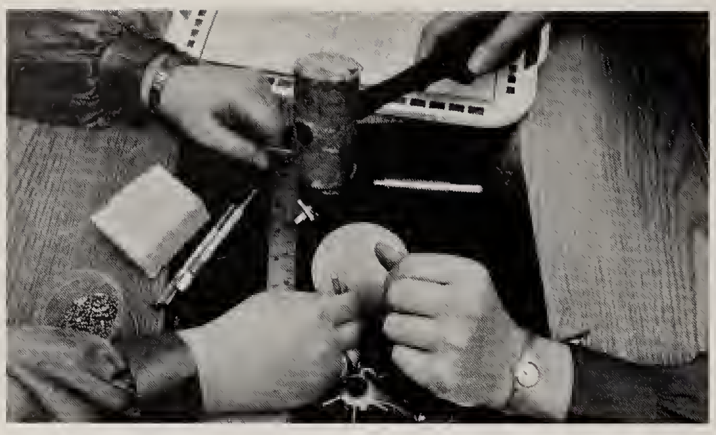
Patients are assigned to one nurse who monitors both their medical and emotional conditions. "Most of our nurses have bachelor's degrees and have become registered substance abuse counselors," McGuire says.

Occupational therapists work with alcoholics on leisure time management because so much of their recreational time has centered on "the next drink." Since drinking heavily for a long period of time can bring about memory loss, psychometric assessments are performed to evaluate the level of impairment. Sensorsizing exercises help alcoholics regain coordination.

Because alcoholism is a "family" disease, family members are encouraged to participate in group sessions where the disease process is discussed and where these relatives can learn more about how the disease has affected them.

The trend today is toward short-

ChemStress staff demonstrates the human knot, one of sensorcizing exercises used to help alcoholics regain coordination.



term hospitalization (averaging around seven days) with extended outpatient treatment and lifetime participation in support groups, such as Alcoholics Anonymous.

The main reason for this extended outpatient treatment is to prevent relapse or the return to drinking. "One of the most revealing facts to come out of our lithium study was the fact that some 40 percent of all patients in the study not taking lithium relapsed in the first month post-hospitalization," Dr. Fawcett says. "And within the first four months, most of the relapses occurred."

There are many ways a person can relapse without picking up the first drink, according to McGuire. "Often, when we talk with a person who is in treatment following a relapse, we discover that the relapse began with attitude changes, not with the first drink."

Mood changes—anxiousness, irritability—often accompany the attitude changes. These mood changes can signal that an alcoholic is reliving a particular pattern of feelings that may have led to drinking problems in the first place.

The frequent and intense sessions in the first months in the ChemStress outpatient program help therapists monitor these changes and intervene before the alcoholic takes the first drink.

The ChemStress clinical staff develops a profile on each of the patients in the outpatient program. "We look at a person's socioeconomic background, marital status, history of family drinking problems, contributing psychiatric problems, and ability to comply with treatment recommendations," McGuire says. "A profile is developed to help us predict who will be at greatest risk to relapse."

Treatment regimens are tailored to meet each patient's lifestyle, but usually include counseling, participation in group therapy programs, access to community support groups, medication as needed for depression, anxiety or chronic pain, and biofeedback. The ChemStress staff works closely with the patient's physician to integrate the treatment plan into the patient's overall medical needs.

Two new programs have recently been introduced for ChemStress patients. Because the physical condition of many alcoholics is compromised by alcohol, ChemStress developed a fitness program to help alcoholics regain physical health. The fitness program includes both fitness and stress evaluations and can encompass stress testing, if appropriate; an inventory of the amount of current exercise; and the development of a profile of the alcoholic's current life stresses. Working with exercise physiologists, the ChemStress staff tailors an exercise program for the alcoholic, which can range from a walk a day to more strenuous aerobic classes.

In February, 1986, ChemStress began offering a stress management seminar for executives. The program focuses on the various stresses executives encounter both in the workplace and at home. "We're incorporating an educational approach with group therapy to help executives and their families understand the process which led up to the addiction problem and what can be done to treat it," Dr. Fawcett says.

But some alcoholics continue to relapse, no matter what traditional therapies or treatments are used.

"We feel that these people can be helped," Dr. Fawcett says. "Although lithium carbonate won't be necessary for every alcoholic, we believe that it may help those who chronically relapse. It might be the only chance these people have to remain abstinent."

An important element of the ChemStress program in today's cost-conscious society is the cost effectiveness built into each patient's treatment program. Psychiatrist Phillip Epstein, M.D., a

Inpatient alcohol and substance abuse treatment program staff Linda Olson, M.O.T., O.T.R.; Marcella McGuire, R.N., S.C.A.C., head nurse, and Dean Koenig, R.N. discuss program development with Kathy Myskowski, ChemStress.

> *"It's very clear that alcohol damage is very extensive in brain tissue. What is even more interesting is that (once drinking stops) the brain does seem to regenerate and the tissue density increases toward normal."*
>
> **Richard Penn, M.D.**

director of ChemStress and former medical director of utilization management for the Medical Center, points out that the 1983 Blue Cross Probe Reports show that the average cost for hospitalization for alcohol treatment is $5,300. According to Dr. Epstein, cost-benefit analysis of the traditional treatment method—$5,300 per patient with only a 30 percent chance of success after one year—indicated that an alternative method of treatment was necessary to meet the cost containment efforts both in the health industry and public and private sectors.

"We have developed and continue to modify a system which integrates clinical management with administrative and fiscal/utilization management systems so that we offer quality and cost-effective clinical services," Dr. Epstein says.

Part of this system included the streamlining and updating of the documentation system, i.e. intake forms and discharge summaries. This allows ChemStress staff to track each component of treatment that patients receive more effectively. Another part of the system is micro-costing or breaking out individual costs for each of the clinical services.

This careful tracking of treatment and costs has allowed ChemStress staff to develop a unit cost for all services. "Patients are charged a specific amount for each unit of treatment they receive," Dr. Epstein says. Treatment can range from participation in group or individual therapy to counseling sessions to medication evaluation.

"In the past, patients were usually charged one sum for treatment," he explains. "With this system, if you don't require as many sessions as someone else, you aren't paying the extra costs."

Multiple Problems Spawn Multiple Studies

Since alcohol abuse affects more than 14 million Americans, alcoholism has ramifications for all medical specialties. Current research underway at the Medical Center is studying the problem from many different angles.

Alcohol's Effect on Sleep Disorders

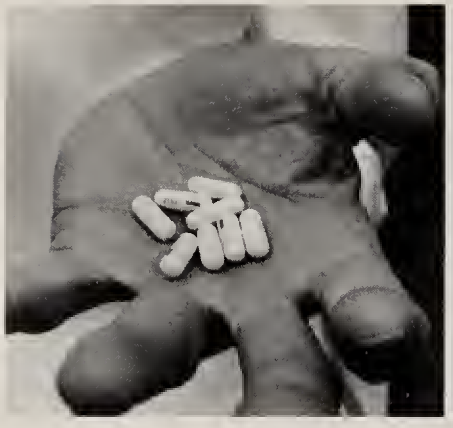
"Alcohol affects sleep by causing a fragmentation of the dream cycles," says Jamie K. Lilie, Ph.D., assistant professor, psychology and social sciences. "People who use the sedative properties of alcohol to bring on sleep only reap a short-term benefit because, as alcohol is metabolized, it causes a lightening of sleep. They pay the next day because they have not received a good quality of sleep."

Dr. Lilie and her colleagues are studying the effects of alcohol on sleep disorder patients. Using a self-report questionnaire which tracked drinking patterns over 30 days, researchers discovered that, in general, men drank more than women. They divided the patients into two groups, insomniacs and hypersomniacs. "We thought the insomniacs would drink more because of the sedative properties in alcohol," she says. "We were surprised to discover that the opposite was true. There was a strong tendency for those who were excessively sleepy to drink more than those with insomnia."

To find out why this should be, researchers have concentrated efforts on the relationship of depression and alcohol to sleep apnea and the effects of alcohol on people with narcolepsy and sleep apnea.

"We found a lot of variability and not much departure from alcoholism norms within the general population," Dr. Lilie says. A current study focuses on apneics exclusively. People with sleep apnea tend to have cardiovascular problems (hypertension); alcohol also has harmful effects on the heart. Dr. Lilie and her colleagues are measuring patients' blood pressure

Jamie K. Lilie, Ph.D., searches for alcohol impairment in sleep disorder patients.



to determine to what extent drinking exacerbates sleep apnea.

Brain Damage and Its Reversibility

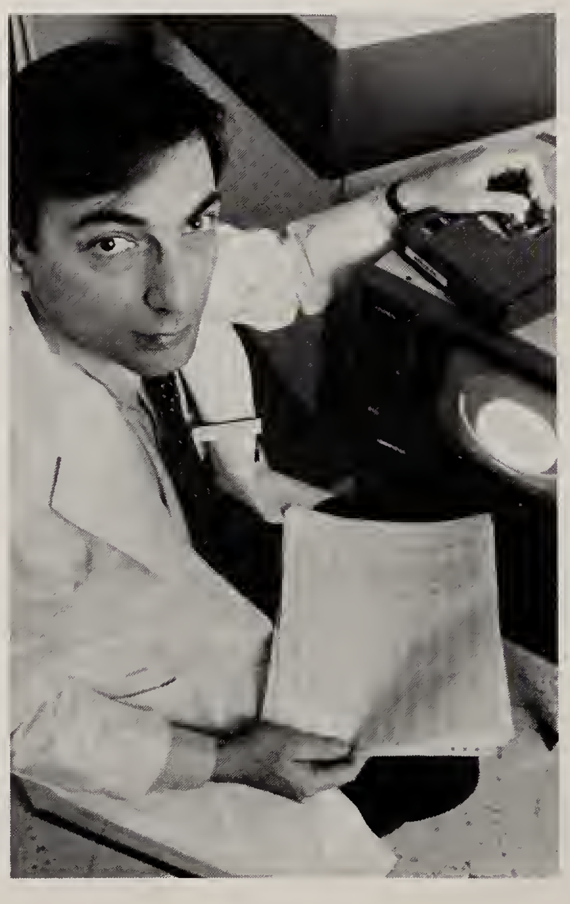
The heavy consumption of alcohol causes actual atrophy or shrinkage of brain tissue. Among the many end results of alcohol-induced brain damage is loss of memory, judgment and coordination. The actual physical effects of chronic alcohol abuse and their correlations to other physical and emotional changes in the alcoholic is one of the interests of Richard Penn, M.D., professor, neurosurgery, in collaboration with Peter Carlin, M.D., Addiction Research Foundation, Toronto, Canada.

During his initial studies begun in 1978, Dr. Carlin, through the use of computerized tomography (CT) scans, noticed that the atrophied brain tissue of some alcoholics seemed to increase toward normal following abstinence. Since part of Dr. Penn's research interests include the quantitative measurement of the size and shape of the brain, Drs. Penn and Carlin decided to work together to see if there was any correlation in the brain tissue's return to normal with the other physical and emotional changes that were occurring in the abstinent alcoholic.

They devised a series of research projects in which alcoholics from a Toronto alcoholism treatment center were studied. A variety of tests and evaluations were used to track cerebral atrophy and to gather information about the subjects' general physical and emotional conditions. The alcoholics received CT scans, psychological tests and blood tests including liver enzymes at four-week, three-month and six-month intervals. The CT scans gave a complete cross-section picture of the brain at small increments; the blood tests monitored each alcoholic's general condition. CT scans were sent to Rush-Prebyterian-St. Luke's Medical Center for evaluation by Dr. Penn and researchers in the Section of Radiation Physics.

"I can't think of anything—except for some diseases, radiation and some drugs—that produces as much striking brain damage as alcohol," Dr. Penn says. "There is a drastic decrease in both the size of the brain tissue and its density."

Although recovered alcoholics report their memory and coordination returned following cessation of drinking, Dr. Penn and his colleagues are among the first to actually track the physical recovery of the brain and correlate it with the other physical and emotional changes occurring in the alcoholic.



Richard Penn, M.D., analyzes CT scans of alcoholic patients.

They found that of 40 alcoholics in their current study, better than one-half showed increased amount of grey matter at the six-month evaluation. But the grey matter continues to decrease in size in some alcoholics. "We're trying to find out why," Dr. Penn says. "We suspect that some may have returned to drinking, while others have liver disease or other physical disorders which are preventing the brain's return to normal.

"Our hypothesis is that alcohol acts as a toxin and inhibits protein synthesis of the brain cells," he explains. "The recovery or return to normal size of the brain is due to the recovery of cellular function."

Researchers are also trying to find answers to many questions generated by the initial studies: is there a correlation between anatomical recovery and psychological recovery and what areas of the brain are most affected by alcohol.

"It's very clear that alcohol damage is very extensive," says Dr. Penn. "What is even more interesting is that (once drinking stops) the brain does seem to regenerate and that the tissue density increases towards normal."

Effects on Male Sexual Development

The work of Robert A. Anderson, Jr., Ph.D., associate professor, obstetrics and gynecology, indicates that chronic alcohol ingestion can affect male reproductive function. Using an animal (mouse) model, Dr. Anderson discovered that the extent of reproductive impairment is proportional not only to the duration of alcohol exposure but also the amount.

Decreased testicular weight and sperm counts, altered hormone lev-

"We found that alcoholics who could build social networks stayed sober longer and maintained a job for a longer time."

Luther Christman, Ph.D., R.N.

Robert Anderson, Jr., Ph.D., measures the effects of alcohol on male sexual development.

els, and impaired ability of sperm to fertilize eggs both in vivo and in vitro were some of the effects of chronic ingestion of alcohol described by Dr. Anderson.

A current project is to describe certain risk factors associated with chronic alcoholism during adolescence and to delineate the mechanisms by which alcohol exerts its negative effects. "It's likely that hormonal perturbations underlie the impairment of sexual maturation by alcohol, because of all the critical hormonal changes occuring during this time," he says.

"Since we can't use adolescents in our research, we examined mice from ages 20-49 days which correspond in development to that of a teenager," Dr. Anderson says. He found that mice given alcohol had significant reproductive impairment at the end of four weeks. The time by which sexual maturation was delayed in mice was a span comparable to two years in man. Once the alcohol ingestion stopped, however, reproductive function eventually returned. "If we had increased the blood levels of alcohol, irreversible impairment would ultimately occur," he says.

Statistics show that 75 to 80 percent of all high school students have consumed alcohol and, of those, 30 percent are problem drinkers. "We think it's important to identify the risk factors involved so that they can be incorporated into educational programs which focus on drinking problems," Dr. Anderson says. "Sexual impairment can be associated with a psychological stigma, causing a vicious cycle of not being able to perform sexually which can feed into an already serious drinking problem."

Dr. Anderson and his colleagues have also discovered that there is a direct effect of alcohol on the ability of the sperm to penetrate the ovum. 'The alcohol inhibits sperm capacitation in the female reproductive tract," he explains. "This may account for some of the unexplained cases of infertility. While alcohol suppresses inhibitions and can increase sexual desires, it also, in effect, serves as a contraceptive in that it sometimes blunts the ability of the sperm to penetrate the egg.

"I don't recommend alcohol as a contraceptive, however, because of its many deleterious effects," he cautions.

Describing the Alcoholic

Most professionals in the field of alcoholism acknowledge that alcoholics are a heterogenous group with few characteristics in common. Rush researchers Luther Christman, Ph.D., R.N., the John L. and Helen Kellogg Dean of the College of Nursing, and Michael Counte, Ph.D., associate professor, psychology and social sciences, took this premise one step further and examined the differences between groups of alcoholics.

Drs. Christman and Counte evaluated 600 people admitted to the inpatient alcoholism program at the Medical Center. "We broke the 600 into subgroups—young versus old,

Michael Counte, Ph.D., (l) and Luther Christman, Ph.D., R.N., evaluate subgroups of alcoholics.

binge versus steady drinkers—to better describe the differences occurring in each of the subgroups." Dr. Counte says. "To date, most alcoholism treatment programs offer one form of treatment for everyone. Dr. Christman and I concluded that this was an inefficient and ineffective way to treat the problem. We hoped that our research would pave the way to the development of treatment programs, and, more specifically, group therapies, which would address specific needs found in each of the subgroups."

A special interest of Dr. Counte's is alcoholism among the elderly. "As our population of elderly continues to grow, so does the problem of alcoholism in this group," he says. "Yet, the elderly alcoholic is protected from detection by his/her environment, because, for the most part, many of our elderly are very isolated and, therefore, can mask the problem better."

Dr. Counte found that there were two types of elderly alcoholics. The early onset drinkers are those who began drinking at an early age and continued throughout their lives. This group was more likely to have serious medical and emotional problems. The late onset drinkers began excessive drinking around retirement age, largely because of social isolation due to retirement or loss of spouse.

"The late onset drinkers had a much better rate of recovery because they did not have the medical and emotional problems of the early onset drinkers," he says. "We found that when these people were provided with social support systems, part-time jobs, avocations and volunteer work, the drinking problems were helped immensely.

"The early onset drinker needs a completely different type of program which includes medical intervention and extended group therapies to respond to the severe medical and emotional problems these people have spent a lifetime developing."

Dr. Christman's interest lies in sociology and anthropology. "Each of us functions in a small niche in society," he explains. "Within this niche, we act out a lot of roles to ensure a proper social fit." When a person does not have the skills to play the many required roles, aberrant behavior often occurs. This behavior manifests itself in many ways: addiction, psychoneurotic diseases, illness, social isolation.

Dr. Christman found that alcoholics with a poor social fit were unable to read cue lines properly. "For these people, much of group therapy work must center on resocializing, on giving them the basic skills with which to play roles," he says. "We found that alcoholics who could build social networks stayed sober longer and maintained a job for a longer time."

For the Better, For the Worse

With the new trend to be physically fit has come some "sobering" news: many Americans are changing their drinking habits. The before-dinner scotch and water or martini have been replaced in many social circles; a glass of white wine, Perrier water or liquorless fruit juice "cocktails" are in, booze is out.

Along with this trend is the increasing number of celebrities to go public with their drinking or drug problems. We now see stories appearing in the media telling of the fight of some famous person to "kick the habit." To admit to one's addictions and seek treatment is becoming acceptable.

That's the good news.

But the disheartening news is the recent trend toward polyaddiction, especially among those under 40 years old. More people today are trading mixed drinks for mixed substances than are giving up liquor all together. Alcohol and marijuana are the most popular choice, followed by alcohol and cocaine, and alcohol and prescription drugs such as Valium.

This polyabuse problem is rooted in adolescence, when experimenting with different drugs is not uncommon. Health care professionals are discovering that dual abuse problems are harder to treat, the recovery process is longer, and the relapse rate is higher.

"Although dual addictions complicate the picture," says Dr. Fawcett, "the underlying, and still number one problem, however, remains alcohol abuse.

"Studies are underway to discover biochemical solutions, like lithium carbonate, to help alcoholics; scientists are looking for biological markers to assist in the early detection of those who are at risk of becoming alcoholics; and current methods of treatment are coming under close scrutiny with the hope that more effective treatment programs can be developed," he says. For the 14 million alcoholics in America, help, it would appear, need not be the next drink.

Study Focuses on Physician Impairment

Recent studies show that the prevalence of alcoholism among United States physicians is similar to that in the adult population of comparable socioeconomic status (between seven to ten percent). Other studies also conclude that physicians are 30 to 100 times above the normal population in the misuse of drugs.

"Twelve to seventeen percent of all physicians have an alcohol and/or drug problem," says Jeffrey M. Tilkin, M.D., assistant professor, psychiatry. According to Dr. Tilkin, the following factors contribute to physician substance abuse: increased accessibility to drugs; the high pressures of the profession and the omnipotent feeling that they have extra special knowledge.

The period of time when physicians are most at risk for substance abuse seems to stretch from medical school into private practice. Says Jan Fawcett, M.D., the Stanley G. Harris, Sr., professor and chairman of psychiatry: "We see a peak in behavior disorders among people who are between the ages of 20 and 40. For physicians, this time period is extended because they are usually able to conceal the problem longer and because the physician tends to lag ten years behind the general population in 'life stress' development because of the many years spent in medical school, internship and residency."

Rush researchers are trying to pinpont where and when the problems begin. In September, 1982, Gerald S. Gotterer, M.D., Ph.D., associate dean for medical student programs, Rush Medical College, and several colleagues initiated a longitudinal research project to study student adaptation to medical school. "It's logical to assume that the tendency toward impairment begins while would-be physicians are in medical school," he says. "We are trying to understand what is happening to the students as they progress through medical school, residency and out into practice and to pinpoint the problem times and types of behavior which can lead to impairment. We hope our work leads us to preventive measures which can be taken early in the physician's career."

The study is far-reaching, examining many facets of the students' backgrounds, personality traits, social networks and impairment tendencies. The work of David Clark, Ph.D., assistant professor, psychiatry, focuses on alcohol and drug consumption by the students.

Dr. Clark and his colleagues collected data on the students at orientation on the first day of medical school and then at six-month intervals. Several papers which have grown out of the analysis of the first two years of school discuss alcohol consumption by students. "We asked the students to describe quantitatively how much alcohol they consumed weekly," he explains. "At the two-year point, women students tend to drink an average of one and a half ounces of ethanol weekly, which equals one drink every two days. Men drank two and a half ounces weekly or three drinks every two days on the average."

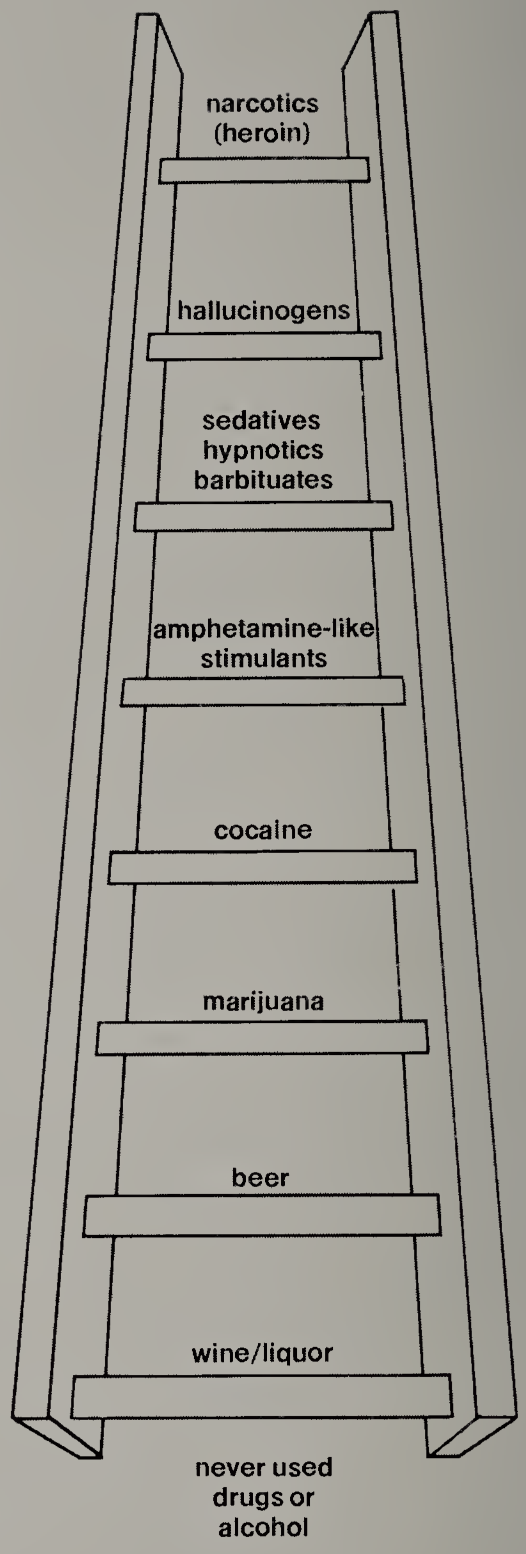
Students were also asked to classify their own drinking as very light, light, moderate, heavy or very heavy. Their orientation day classifications did not correspond well to their rate of alcohol intake because of the very different backgrounds the students came from. "Some of the students came from large universities where heavy drinking in the context of social fraternities was accepted; others came from small schools where there was relatively little drinking," he says. "But by the spring of the first year, the students had spent enough time getting to know each other and observing each other's drinking habits so that they were able to determine where they stood among their classmates in regard to their own drinking habits. It's amazing how quickly that type of information gets noted, shared and processed."

The breakdown of the different classifications was very distinct and the ranges of amounts of ethanol very small. The class decided that heavy drinkers drank more than eight to nine ounces of ethanol weekly (or more than two and one half drinks per day).

"At this point, we cannot predict whether the heavy drinkers will become alcoholics," he points out. "There may be some people who can drink excessively and still function academically and socially and never develop alcohol-related problems. What we're trying to do is to define groups we can study over time to see which students in each of the categories develop substance abuse problems."

Researchers have been able to develop a preliminary profile of the heavy drinkers. "At this time, there are no academic differences between the categories of drinkers," Dr. Clark says. "However, the heavy drinkers tend to have a larger circle of friends but relatively less emotional intimacy or emotional sharing with these friends. They also tend not to be concerned with what other people think about them."

The conclusions reached at the end of the project will not be used as a screening test for admission to medical school, Dr. Clark stresses, but rather as an early detection system for finding people early on who are drinking at levels that are eventually going to cause problems, or who are exhibiting types of behavior which are likely to lead to substance abuse problems. "More importantly," he says, "we hope to



This ladder is used to measure characteristics common to student use of alcohol and drugs.

use the results as an educational tool which will allow us to go to future medical school classes and show them what can happen.

"If we find that the heavy drinkers sail through school, residency and early years of practice with no substance abuse problems, I think we are obligated to share that with the students," he says. "But, if we find that we are identifying unfolding alcoholics, we have information we can use as an early warning system to head off potential problems."

Dr. Clark and his colleagues have also developed a very sophisticated way to measure characteristics common to the students' use of alcohol and drugs. Their psychometric defines a nine-step ladder starting with step one which includes those who have "never used alcohol, drugs or cigarettes," through step nine, which includes those who have used narcotics (heroin).

"We've discovered that if students have used the drugs on step seven, they have also used all of the drugs on the steps underneath," he says. "The ladder helps us to see how drug-involved the person really is. Looking just at alcohol use or just at use of specific drugs can give a skewed picture.

"Let's say that one student doesn't use much alcohol but is using six or seven other drugs excessively," Dr. Clark explains. "The ladder helps to give us a composite picture of what is happening to this student."

Researchers hope to follow the students through internships, residencies and into practice. "We're going to learn a lot about these students as they progress through school and into practice," he says. The researchers hope to discover which students become substance abusers and which ones don't, and, of the ones who recover from heavy drug and alcohol use, what personality characteristics are associated with good recovery from their addiction.

They also hope to learn when on the time continuum between medical school and practicing medicine does the rate of misusing drugs leap from being normal to 30 to 100 times greater than normal. "It's feasible to predict the surge will come following residency, when students are out on their own and less institutional support and training comradeship are available to support them," he says. "Alternatively, it's possible to suppose that the students become fascinated with how drugs work while they are in school and that the abuse problems actually start early on.

David Clark, Ph.D., reviews computer data from medical student study.

"If we knew when the problems began, we could tell future medical students when and how the problem unfolds," Dr. Clark says. "All we can say now is that 'you are at 30 to 100 times greater risk than the general public, but we don't know when it happens or how it happens!'"

Interest in this study is broad-based. The 1982 study was supported in part by the Kroc Foundation and a distribution from the Searle Fund grant of The Chicago Community Trust. Researchers recently received a grant from the National Fund for Medical Education to continue their study.

The medical student study has already generated national interest. "We've received calls from schools all over the United States requesting more information about our study and the results we've come up with so far," Dr. Clark says. "What we ultimately hope to do is to combine all the aspects of the study and draw conclusions which will be helpful to all colleges and universities, not just medical schools."

But what is being done now to curb the problems? "I don't think you find drug or alcohol abuse problems any more or any less among surgeons than other physicians," says Steven G. Economou, M.D., the Helen Shedd Keith professor and chairman of general surgery. "I think we, as surgeons, have a more difficult time monitoring abuse problems because our specialty is a solitary exercise at certain times. During an operation, the patient is unconscious and, therefore, helpless to participate in making a decision about withdrawing from actions by the surgeon that the patient perceives as detrimental. The integrity of the surgeon is essential because the patient can be harmed by what a surgeon does or doesn't do. An incompetent removal for removal for cancer, for example, can be harmful just as surely as a missed diagnosis."

Dr. Economou believes that this integrity needs to be instilled early. "We tell our residents that they are their own consciences," he says. "I point to some aspects of being a surgeon for which there is no room for impairment of any kind."

Surgeons must make split-second decisions during an operation which require an acuteness of judgment made under very stressful conditions. They must also maintain physical fitness required to operate through long surgical procedures.

The Department of General Surgery has established a liaison program with the Department of Psychology and Social Sciences to provide counseling for residents if necessary. "In some cases, surgery may not be the appropriate specialty for a resident who cannot handle the special stresses found in a surgical setting. We try to recommend other specialties for which that resident may be more suited," Dr. Economou says.

But who is watching the watch dogs? At the Medical Center, a very detailed set of guidelines and policies. Says Roger Bone, M.D., the Ralph C. Brown, M.D., professor and chairman of internal medicine: "Before a physician is given privileges, there is an extensive background check, including three to five letters of recommendation. Qualifications are important, but our department also looks closely at the individual."

There is also a departmental system for which complaints against physicians can be lodged by anyone—other physicians, nurses, patients. "Our committee performs a very confidential check on the physician," Dr. Bone says. "I've been here two years and, to date, all of the complaints have been unfounded. I think our lack of physician impairment problems is due to the care and time we take with initial background checks in the beginning."

The Joint Commission on Accreditation of Hospitals has also recently instituted a requirement which states that all chairmen of departments must sign a statement attesting that each of the physicians working under them is in good physical condition. "The JCAH is holding us responsible for the physical health of each of our physicians," says Dr. Fawcett. "I think the requirement is good as far as it goes. Unfortunately, it does not encompass psychiatric or substance abuse problems."

No one seems to have an answer or set of criteria to help decide when a physician can start practicing again, following treatment for alcohol and/or drug abuse. "That's the hardest part of the whole physician impairment issue," Dr. Fawcett says. "According to statistics gathered by alcoholism treatment centers in Atlanta and at the Mayo Clinic, physicians have a recovery rate of 90 percent. I think the main reason behind this high rate is that physicians don't want to lose their licenses.

"I've found that alcoholics in general will lose family, friends and health, but when threatened with the loss of job, will decide to do something about their drinking problems," he says. "Doing something about your drinking is one thing. Being able to re-enter a set of situations or patterns which caused the original problem may be quite another."

TRANSPLANTATION:
Heart and Liver Newest Programs at Medical Center

The medical miracle of organ transplantation has made it possible for thousands of children and adults to overcome the odds posed by severe illness or dysfunction. More than 35,000 transplantation operations were performed in 1984 in the United States—most at special centers with recognized expertise in these delicate, often complicated and lengthy procedures.

At Rush-Presbyterian-St. Luke's Medical Center, active programs in bone, bone marrow, kidney and cornea transplants have been in place for some time. Each has contributed to providing new hope and extended lives to seriously ill patients from all parts of the United States. Medical Center statistics show that in recent months there have been 17 bone marrow transplants; 43 transplanted kidneys, and 32 cornea transplantations. In addition, 10 percent of all large segment bone transplants in the United States were performed at the Medical Center.

During 1985, the Medical Center's transplantation capabilities were expanded by two new programs—in liver and heart. The liver program, which got underway in August, has already served 14 patients, with ten on the list awaiting donors. The Medical Center was ready to perform heart transplants in December.

THE LIVER PROGRAM

Biliary atresia... primary biliary cirrhosis... chronic hepatitis... words that may be unfamiliar to many people, are but a few of many medical conditions for which a liver transplant is the only hope for survival.

The liver, the body's largest solid organ, is the metabolic bank of the body: it regulates carbohydrates, proteins and lipid (fat) metabolism; synthesizes proteins and clotting factors in the blood; and removes toxic substances from the blood.

Eighty percent of the liver can be surgically removed and it will regenerate to normal size and function within a few months. Yet humans cannot live for more than two days in the complete absence of liver function.

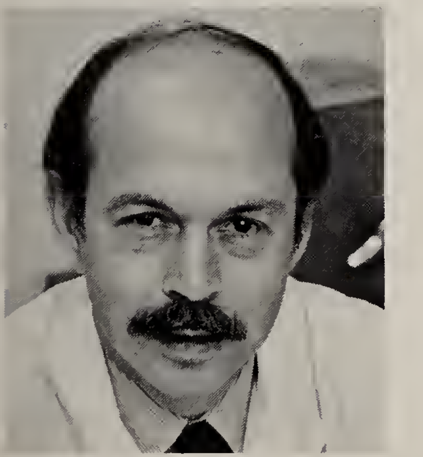
In 1967, the first successful liver transplant was performed. Today, liver transplantation is available at 27 centers in this country.

This life-saving procedure is now offered to patients at Rush-Presbyterian-St. Luke's Medical Center. The liver transplant program, is under the direction of James W. Williams, M.D., the Jack Fraser Smith professor of surgery, and director of the Section of Transplantation in the Department of General Surgery.

"With the inception of this program, we are now able to treat the entire spectrum of liver problems, including complicated end-stage liver disease," says Steven G. Economou, M.D., the Helen Shedd Keith professor and chairman of general surgery. "The Medical Center had all the clinical and support services needed to embark on a liver transplant program; all we needed were the surgeons. In Dr. Williams and his colleague, Dr. Santiago Vera, we have two transplant surgeons of national distinction."

Dr. Williams and Santiago R. Vera, M.D., assistant professor, general surgery, joined the Medical Center staff in July. The two had been associated with the University of Tennessee Medical Center's liver transplantation program, which they developed into one of the leading programs in the country. While at the University of Tennessee Medical Center, Drs. Williams and Vera performed more than 60 liver transplants with a survival rate that is among the best in the country.

Their first liver transplant at the Medical Center was performed on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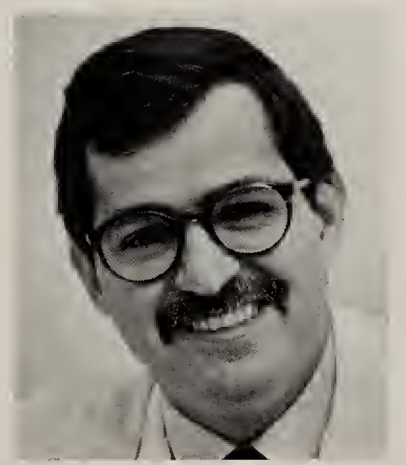
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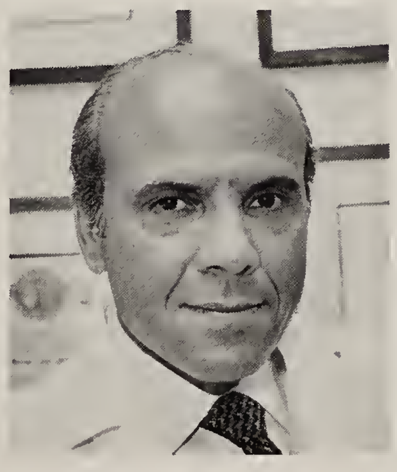
Hassan Najafi, M.D.

Roger A. Billhardt, M.D

The first liver transplant patient, Carolyn Johnson, with James W. Williams, M.D., and Linda Haggerty, M.S., R.N.

August 23; since then there have been 18 transplants on 14 patients.

The new program includes, in addition to liver transplant surgeons, hepatologists and nurse-clinicians. It also uses the services of the Medical Center's Organ and Tissue Recovery Program which, over the past three years, has arranged more than 100 multi-organ procurements.

Once a donor for a liver is identified, and accepted, the scenario for liver transplantation goes something like this:

- The recipient is notified of the availability of the donor liver and travel arrangements are confirmed, including estimated time of arrival of the recipient at a Chicago airport. Liver transplant patients have come to the Medical Center from many parts of the United States—California, South Carolina, New Jersey and Oklahoma, for example. Most are transported to Chicago by an air ambulance and then to the Medical Center by ambulance.
- When arrival time of the recipient is determined, appropriate departments and staff are notified: surgical intensive care or pediatric intensive care, depending on the age of the recipient; surgical admissions, emergency room, operating room, blood bank, clinical laboratories, social worker, administrator on call and the office of public relations.
- Once all this is put in motion the procurement team, composed of two liver transplant surgeons and a procurement coordinator, goes to the donor hospital. Medical Center teams have flown as far as Louisiana, South Carolina, and Calgary, Alberta, to procure a liver.

It takes approximately four hours to remove a donor liver surgically. During that time, the procurement coordinator contacts the Medical Center twice: after the surgeon has actually looked at the liver and determined it is suitable (this is the go-ahead for the recipient liver transplant surgeon at Rush to begin preparing the recipient) and again to give the estimated time of arrival of the team with the liver. The team prepares the liver (flushing with chilled preservative solution), packs it in an ice cooler and returns with it to the Medical Center.

Liver transplants are considered the most technically difficult and complex of all organ transplant procedures. At any one time, 13 percent of the body's blood supply is circulating in the liver, making for a high risk of hemorrhage.

Replacing the liver requires three major connections of large veins and one major artery: the portal vein, the two vena cavae and the hepatic artery. This vascular splicing phase alone can take up to 90 minutes. Other vessels, such as the bile duct, must also be connected. The actual transplant procedure can take eight or more hours to complete.

Liver transplant patients are hospitalized for an average of 35 days following surgery. As with kidney and heart recipients, liver transplant patients must follow a strict medication regimen, including the

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INSIGHTS 20

INTO CLINICAL AND SCIENTIFIC PROGRESS IN MEDICINE

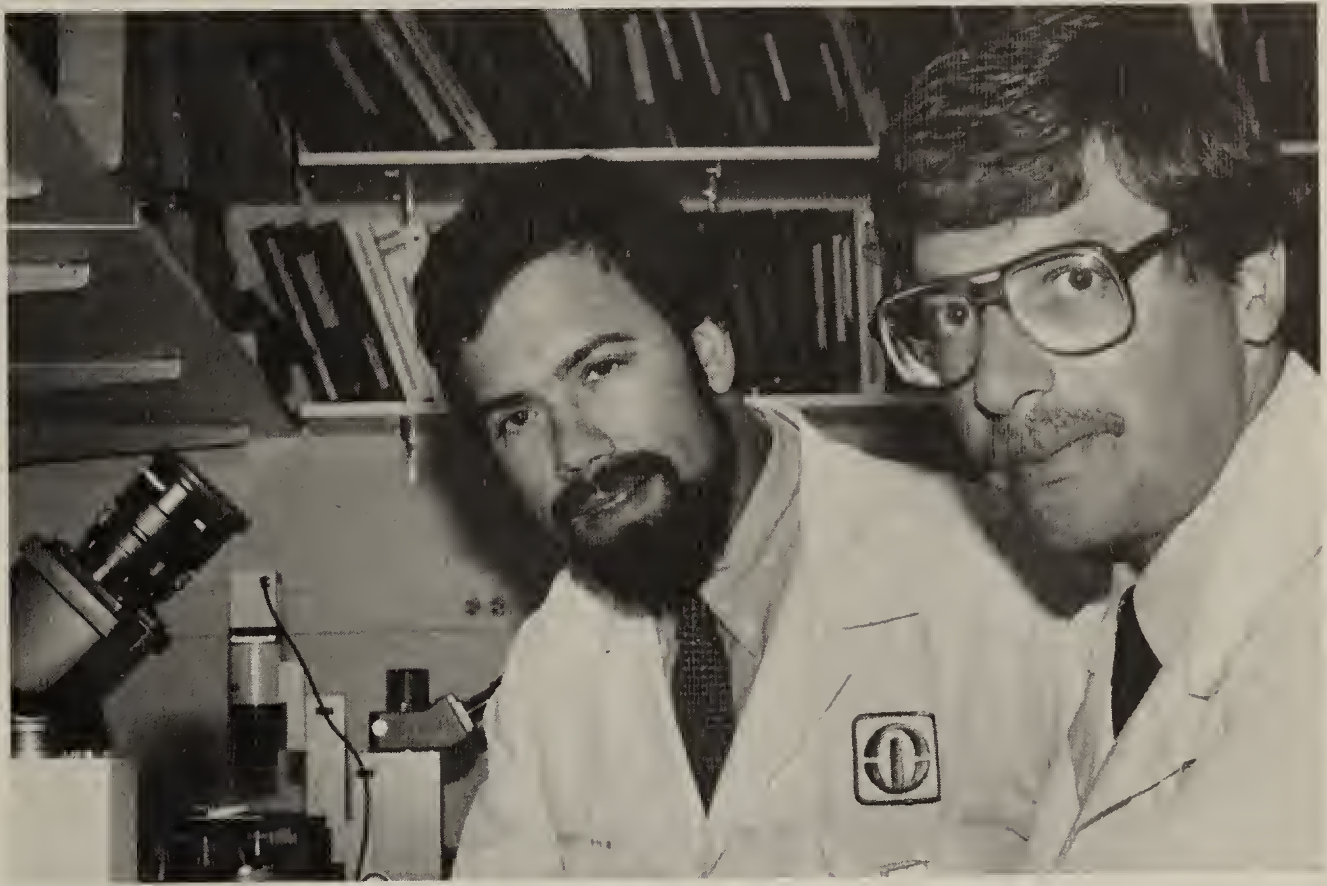
VOLUME 10, ISSUE 1, WINTER 1986

Activating The Immune System

People suffering from leukemia, lymphoma, aplastic anemia and some types of solid tumors have one thing in common—their bone marrow is failing to produce the healthy white blood cells needed to protect their bodies from viruses, bacteria and other invaders. For many of these people, a bone marrow transplant is the only way to survive.

But it usually takes about a year before transplanted bone marrow begins functioning properly. During this period, two major components of the immune system, antibodies and T-cells, perform poorly or not at all, making patients susceptible to hundreds of life-threatening infections.

"The question is, 'why does the immune deficiency exist'? We would expect the bone marrow to begin functioning immediately, especially with autologous transplants, where the patient receives his or her own marrow after it has been removed and treated," says Alan L. Landay, Ph.D., assistant professor, Department of Immunology/Microbiology, and director, Clinical Immunology Laboratory and Flow Cytometry Facility.



Alan L. Landay, Ph.D. (l) and Howard M. Gebel, Ph.D.

There are two theories on why the immune system takes so long to begin functioning. The first is that it takes time for transplanted bone marrow to mature. Before the transplant, the patient's old immune system is eliminated through irradiation, killing any malignancies as well as any cells that would attack the transplanted marrow. Most of the transplanted cells are immature, since mature cells would attack the new host. Therefore, the patient is without an immune system until the cells mature, Dr. Landay explains.

"There's also the possibility that certain cells in the immune system can suppress other cells," he says. "We're trying to determine if one or the other reason—or probably a combination of both—causes the deficiency."

Dr. Landay and his colleague, Howard M. Gebel, Ph. D., assistant professor, immunology/microbiology, and director of the General Immunology Laboratory and the Histocompatibility Laboratory, are studying blood samples of patients who have received transplants through the Medical Center's Thomas Hazen Thorne Bone Marrow Transplant Center. The researchers use monoclonal antibodies (products of cloned cells manufactured by scientists to recognize predetermined targets) to identify specific molecules on the surface of post-transplant white blood cells called lymphocytes.

"We're looking at various characteristics of the lymphocytes immediately before the transplant, then at two weeks; one, two, three, and six months; and one year after the transplant," Dr. Landay says.

The researchers have already pinpointed several ways in which a bone marrow transplant recipient's cells differ from those of healthy individuals. By freezing and storing cell samples, the scientists will be able to study how each patient's lymphocytes change over time, as well as compare these cells in different patients at the same post-transplant stage.

The study, funded by a grant from the Leukemia Research Foundation, focuses on the Class II molecules found on the surface of T-lymphocytes (T-cells). Two types of lymphocytes are needed to protect the body against disease. B-cells produce antibodies to attack specific invaders, while T-cells have three functions: they kill invader cells, help the B-cells produce antibodies and suppress these activities when an invader is eliminated.

Drs. Landay and Gebel first concentrated on a molecule called HLA-DR, which normally appears on B-cells but not on T-cells. Previous studies indicated that T-cells produce HLA-DR only when they are activated—in the process of killing invaders, suppressing cells or helping B-cells. Usually, resting T-cells show little HLA-DR.

However, the resting T-cells of bone marrow transplant patients have large amounts of surface HLA-DR, even though the cells are not performing their protective duties. If these cells are not truly activated, is there a better measure of activation?

"There is a new surface characteristic that we're beginning to look at that may be a better marker of activation," Dr. Landay says. "It's known as the interleukin II receptor."

Interleukin II (IL-2) is an important regulatory factor of T-cells, and many scientists believe IL-2 and its receptor are the activation mechanisms of the immune system.

When properly stimulated, T-cells produce IL-2, a soluble molecule which is pumped out of the cell and into the bloodstream. Other T-cells express IL-2 receptors, which catch IL-2, triggering the T-cells to divide and differentiate into killer, helper or suppressor cells.

Usually, IL-2 receptors are not present on the surface of resting T-cells in either healthy subjects or bone marrow transplant patients. However, if cells from a healthy person are stimulated with substances called mitogens, a large percentage of the T-cells express IL-2 receptors.

In contrast, very few similarly stimulated T-cells obtained from bone marrow recipients one month after the transplant express IL-2 receptors. In fact, preliminary studies show that less than 1 percent of the cells of patients one month after transplant express IL-2 receptors, even though 80 percent of these cells have HLA-DR. (Scientists previously thought that IL-2 receptors appeared concurrently with HLA-DR.)

"Bone marrow patients are also deficient in IL-2 production. This may indicate that the ability to make IL-2 is an important factor for activation of the immune system. But, are these cells deficient because they're immature or are they mature cells being suppressed?" Dr. Landay asks.

Drs. Landay and Gebel next mixed cells from normal subjects and bone marrow transplant patients and stimulated them with mitogen. After accounting for dilution, the cells produced less than half of the expected IL-2.

"We clearly saw that bone marrow transplant lymphocytes inhibit normal lymphocytes in their IL-2 production," Dr. Landay says.

A third factor, HLA-DQ, may also be involved in the activation process. HLA-DQ is a Class II molecule similar to HLA-DR, although it has not been as well studied. Normal T-cells, stimulated with a specific mitogen, express HLA-DR and IL-2 receptors but essentially no HLA-DQ. Given the same dose of mitogen, 35 percent of the cells of bone marrow transplant patients express both IL-2 receptors and HLA-DQ.

"Since we used separate tests to measure HLA-DQ and IL-2 receptors, we don't know if the same cells express both; if they're on different cells; or if some cells have one factor, other cells both," says Dr. Landay. "However, it's very coincidental that we get exactly the same percentage of cells expressing HLA-DQ and IL-2 receptors, which hints that they may both be expressed in one cell."

Adds Dr. Gebel, "If that's true, it may turn out that HLA-DQ is the Class II molecule that is important in turning on the immune system."

The researchers plan to monitor how the percentages of IL-2 receptors, HLA-DR and HLA-DQ change during the first year after a transplant. They hope to identify how the T-cell system is activated and what may be suppressing it. Ideally, physicians could then develop a way to activate a patient's immune system much sooner after a transplant, decreasing or eliminating the life-threatening immune-deficient period.

Kris Hansen

Collaborating with Drs. Landay and Gebel in this research are: Herbert Kaizer, M.D., Ph.D., director, The Thomas Hazen Thorne Bone Marrow Transplant Center; Robert Karr, M.D., assistant professor of medicine, University of Iowa School of Medicine; and Lisa Gottschalk, graduate student, Department of Immunology/Microbiology.

Detecting Membrane Regulation Of Surfactant In Type II Epithelial Cells

Each year hundreds of thousands of people in this country are afflicted by either adult or infant respiratory distress syndromes—syndromes which occur when lungs are immature or are damaged through shock, trauma or certain drugs. Both diseases cause acute breathing difficulties, and, if left untreated, lungs collapse, causing death. Although both syndromes can be treated with supportive measures, there is no definitive therapy.

Researchers in the Departments of Physiology and Medicine at Rush-Presbyterian-St. Luke's Medical Center hope to aid persons suffering from either of these syndromes by studying the production of surfactant, a substance that keeps the lungs in an expanded state and prevents them from collapsing when air is exhaled. Surfactant is secreted by type II epithelial cells, which line the airspace in the lungs.

Thomas E. DeCoursey, Ph.D., assistant professor, Department of Physiology and principal investigator, and Elizabeth R. Jacobs, M.D., assistant professor, Department of Medicine, and study collaborator, are trying to discover what signals these cells receive and what changes occur in diseases that make them stop producing surfactant.

"One way that a cell can receive signals and detect changes is through its ion channels," says Dr. Jacobs. "All cells are surrounded by a cell membrane, which acts as a barrier, allowing certain substances to move in or out of the cell. Ion channels are 'holes' in the membrane which function like little gates that can open and close a hundred times a second, sending out or letting in electrical currents that either send messages to other cells or receive messages about a change in the environment."

The ion channel is involved in many important biological responses: when nerve cells transmit impulses, when muscles contract, when the heart beats or when hormones are secreted. As far as researchers know, all ion channels perform some type of function for the cell and are very selective regarding the type of electrical currents they will carry.

According to Dr. DeCoursey, when ion channels open their "gates" they let only certain substances pass through, e.g. calcium, sodium or potassium. Each substance that passes through the ion channels helps the cell perform some type of task.

In the past, electrical currents that passed through ion channels were measured by poking a sharp glass probe into the inside of the cell. In this case, the hole made by the probe caused a short circuit between the inside and outside of the cell that was so large that the flow of current through ion

Thomas E. DeCoursey, Ph.D., & Elizabeth R. Jacobs, M.D.

channel could not be seen. Therefore, single ion channels could not be studied directly. Researchers could study only a whole cell, but never a single ion channel. Now, through a new technique called "patch-clamping," researchers can study the properties of individual molecules—ion channels—in cells.

Patch clamping allows isolation of a tiny area of the cell membrane so that researchers can observe the electrical activity and response to a variety of externally applied stimuli.

Through this new technique, Drs. Jacobs and DeCoursey have been able to study the electrical current that passes through the ion channels of type II cells. No electrophysiological studies of individual type II cells have been reported before.

"Phase I of our research was to learn to collect and grow type II cells in a test tube. There are several kinds of cells—macrophages, lymphocytes—in the lungs. We needed to isolate type II cells to be sure we were studying the right ones," says Dr. Jacobs.

With guidance provided by William Claypool, M.D., assistant professor, Department of Medicine, University of Illinois, both doctors learned how to identify and separate type II epithelial cells using the lungs of rats. Enzymes were added to the lung's cells to make them separate and, using other techniques, a group of type II epithelial cells was isolated for study. The cells were grown in an incubator where they continued to produce surfactant. Potassium channels, resembling potassium channels in muscle and nerve cells, were discovered in the type II epithelial cells.

The researchers plan to study the changes that are known to occur in type II cells grown in culture. When the cells are first isolated, they are spherical in shape, but after two weeks the cells' appearance changes—they spread out and flatten. At the same time their shapes change, the cells lose their ability to produce surfactant. The researchers will study whether the ion channels in these cells change as the cells are "transformed" in culture. This knowledge may provide a clue to the function of ion channels in type II cells of the lung.

Now that they have determined the existence of the potassium channels in type II cells, Drs. DeCoursey and Jacobs will concentrate on investigating the function of these channels and will continue to study the cells right after they are isolated, within a few days after isolation, and when they stop producing surfactant.

Both researchers hope that this study will help them understand the way surfactant is produced, so it will be possible to devise specific interventions which will increase or decrease surfactant production in conditions where it is desirable.

Debra Williams

Collaborating with Drs. DeCoursey and Jacobs on this research is: Michael R. Silver, M.D., instructor, Department of Internal Medicine.

Developing A Reversible Male Birth Control Device

Researchers at Rush-Presbyterian-St. Luke's Medical Center are leading a collaborative effort in the development of a new, reversible, male birth control device that appears as effective as the more permanent surgical technique of vasectomy.

While testing continues, the data thus far looks good, says Lourens Zaneveld, D.V.M., Ph.D., senior scientist, professor and director of the Section of Research in Obstetrics and Gynecology at Rush.

Called a shug, the device is designed to block sperm transport in the vas deferens. In a vasectomy, this duct is transected and then the ends are tied together.

"Vasectomy is a popular method of birth control, but what we're seeing now is an increase in requests to have the surgery reversed," Dr. Zaneveld notes. "Even those men who were at one point convinced that they never wished to father children again, change their minds. That could pose problems."

A vasectomy can be reversed through a vasovasostomy, but "this technique requires microsurgery and is highly successful in the hands of only a few clinicians," according to Dr. Zaneveld. "It is also complicated, expensive and not readily applied to a large number of men, particularly not in countries where surgical techniques are less sophisticated."

The shug consists of two silicone (medical grade) plugs held together by a nylon suture. It is implanted in a minor surgical procedure that requires the same or less time than a vasectomy, Dr. Zaneveld explains.

Two small puncture holes are made in the vas wall and a plug is inserted in each. One plug is pushed toward the epididymis (a duct for sperm maturation and storage) and the other is pushed in the opposite direction. The connecting thread remains outside the vas wall, except for the ends attached to the plugs. This allows the plugs to move freely for some distance, helping to prevent perforation problems, but also assuring that they cannot be dislodged.

Single plugs have been tried in the vas deferens, but they were never completely successful in obstructing sperm output in animal studies, Dr. Zaneveld notes. "We're hoping that the double plug will prevent sperm output and that's what we've seen thus far."

Two series of experiments have been conducted using mature rhesus macaques. A total of 13 primates were implanted with the device, each for a period of at least seven months.

Dr. Zaneveld and his colleagues found that, "at least in the primate, the shug is completely successful while the device is in place and sperm passage occurs in 100 percent of the primates on removal.

"The shug has the disadvantage that it needs to be surgically removed but this is also a simple procedure and should not require much more time than a regular vasectomy. The simplicity of the technique makes it practical for clinicians who are not experienced in microsurgery."

When the shug was removed in the animal testing, a milky white fluid containing spermatozoa was found at the epididymal end of the plug nearest that duct and also in between the plugs, but none past the second plug.

"It is possible that the first plug is the primary block to sperm passage," Dr. Zaneveld speculates, "but sperm can pass around this plug, as has occurred during experiments by other investigators. Pressure applied at the beginning of the first plug probably accounts for some vas distension and passage of sperm. However, not enough pressure can be built up at the beginning of the second plug for the sperm to pass around it because there is only a relatively small space between the two plugs which, in fact, may act as a trap for the spermatozoa."

In another phase of the research, 400 rats have been implanted with the device and tests are being conducted to assure that the shug is not toxic in the vas deferens. Once that is completed, the device will be ready for clinical trials.

Lourens Zaneveld, D.V.M., Ph.D.

"There are some men who will never use contraceptives," Dr. Zaneveld notes, "but for those who wish to use birth control, the methods available are few, so the choices are limited. We're trying to widen the range of options."

Krys Kazieczko-Kuszak

Collaborating with Dr. Zaneveld in this study are: James W. Burns, Ph.D., University of Florida; Stan Beyler, Ph.D., William Beaumont Hospital, Royal Oak, Michigan; and Seymour Shapiro, M.D., and William Depel, Ph.D., Bivona Surgical Instrument Company, Gary, Indiana.

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Writers: Kris Hansen
Krys Kazieczko-Kuszak
Debra Williams

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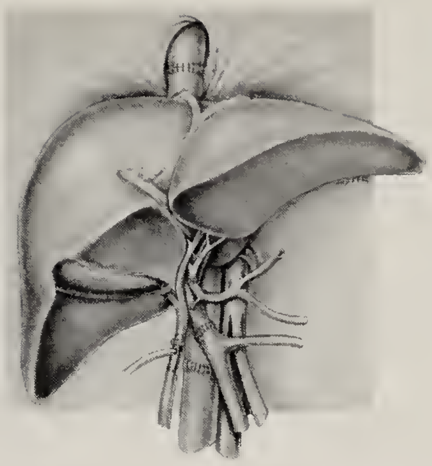


The number of blood vessels leading into and out of the liver makes liver transplantation the most technically difficult transplant procedure.

use of anti-rejection drugs such as cyclosporine and prednisone, for the rest of their lives. They must also return to the Medical Center periodically for follow-up testing and examinations.

Support groups are important to the total recovery of the patient. The liver transplant program at the Medical Center is the only one in the state to offer these types of groups. "Our group is open to patients who are waiting for a transplant or who have already had one and to those who are considering a transplant," says Linda Haggerty, M.S., R.N., liver transplant clinical coordinator. Staff members, Diane Bowman, M.S.W., social services; Ginger Carr, R.N., psychiatric nursing; and Cathy Tupper, patient services specialist, are available to the group to answer questions.

Patients and staff get together once a week to share information and offer much needed emotional support. "The group gives the patients the opportunity to express their fears, concerns and hopes and work through any problems," Haggerty says. "They also have a chance to share thoughts and experiences with others in similar or different stages of the transplant process." This sharing, according to Haggerty, can be very therapeutic and uplifting.

Research is also integral to the liver transplant program. Current projects correspond to the wide range of questions that are concerned with transplantation.

Donor livers, for example, can now only be preserved up to six hours outside the body, thus limiting the distance procurement teams can travel to obtain these organs. "Increasing preservation time to 24 hours would profoundly change liver transplantation," Dr. Williams says. "It would lessen the strain on surgeons and support staff and decrease the cost of a liver transplant by a third."

Howard Sankary, M.D., transplant fellow, is currently developing an animal model which surgeons will use to test their preservation theories.

Other research projects respond to post-surgical problems. One of these seeks to define the histologic characteristics found in liver rejection or malfunction following transplantation. Liver tissue biopsies are routine post-surgical tests. Once these characteristics have been defined, surgeons will be able to pinpoint liver problems earlier in the biopsies and thus reduce the need for a subsequent liver transplant because of rejection or infection.

Drs. Williams and Vera are also involved in research to determine the optimal dosage of cyclosporine, the anti-rejection drug which revolutionized transplantation. Too much cyclosporine can cause kidney problems while too little can lead to organ rejection. "We're trying to minimize kidney toxicity while increasing the efficacy of cyclosporine," Dr. Williams says.

In another study they are investigating the long-term effects of liver transplantation on the heart and lungs. "Liver disease affects both the circulatory and respiratory systems," Dr. Williams says. "We're trying to determine if and when these systems recover following a successful liver transplant."

Santiago Vera, M.D., and Mary Hoffman, R.N., leave Medical Center for Iowa to procure a liver for transplant.

Timing Critical Factor in Transplantation

A number of factors contribute to a successful liver transplant operation; timing plays a crucial role in many of them. This was the issue discussed by hepatologists, liver transplant surgeons and administrators at a recent Medical Center liver transplantation conference.

- E. Rolland Dickson, M.D., a gastroenterologist from the Mayo Clinic, proposed the use of a disease model to predict when a liver transplant should be performed to give the optimal outcome. Choosing primary biliary cirrhosis (PBC), a chronic liver disease of unknown cause which strikes mainly women between the ages of 20 and 40, he developed a four-step histologic (tissue) staging system and defined six variables: age (under 50 years old); the absence of thrombocytopenia (abnormally low platelet count); low urine copper, albumin and bilirubin levels; and the absence of edema (fluid retention).

  Patients who receive a liver transplant during the early stages (I and II) of PBC have a 90 percent, seven-year survival rate. Patients in stages III and IV have markedly decreased survival rates as total blockage of the portal circulation system and bile ducts and end-stage cirrhosis sets in.
- According to Donald M. Jensen, M.D., assistant professor, internal medicine at Rush, patients with primary sclerosing cholangitis (PSC), a scarring of bile ducts leading to end-stage liver disease, tolerate a transplant well. This disease also strikes mainly in the middle years, but, unlike PBC, is seen more in men (70 percent) than women (30 percent).
- Timing is the trickiest in liver diseases such as fulminant hepatitis, according to John A. Payne, M.D., associate professor, internal medicine. "This fatal form of viral hepatitis is characterized by massive necrosis of the liver. Only ten to 40 percent of patients survive, depending on their age. If you wait too long, in the hope that liver regeneration will happen, intracranial pressure can go up and irreversible brain damage occur," he said. "The 'window of opportunity' between irreversible liver damage and irreversible brain damage is difficult to pinpoint, and if the patient is in total liver failure, there is only a ten percent survival rate."
- Seymour Sabesin, M.D., director, Section of Digestive Diseases, shared findings of a recent study at the University of Pittsburgh, outlining when a liver transplantation should be considered.

  Patients with chronic liver disease, he said, should receive a transplant prior to: preterminal variceal bleeding; irreversible renal impairment; a deteriorated condition inconsistent with surgical survival; irreversible hepatic encephalopathy; development of uncorrectable coagulation problems; and onset of severe vascular instability.
- Liver transplant surgeons and hepatologists also came up with a list of conditions for which a liver transplant should *not* be performed; systemic infection; active alcoholism; advanced cardiopulmonary or renal disease; severe oxygen deficiency; any malignant disease outside the liver, and an inability to accept the procedure or understand its nature, risks or costs.
- Time plays a role in post-transplant care of the recipient. James W. Williams, M.D., director, Section of Transplantation at Rush, said that within the first 24 hours post-transplant the major cause of death is inadequate portal circulation and within the first 30 days, vascular clotting, lung failure, coma, donor liver failure, and rejection. But, hepatic dysfunction (rejection), renal failure and infection cause the most problems during the first two weeks post-op.

  Calling them his "triangle of sorrows," Dr. Williams said that these three can feed on each other. "Cyclosporine is given to prevent organ rejection, yet this drug suppresses the immune system which increases the recipient's likelihood of developing an infection. Cyclosporine is also toxic to the kidneys and can cause complete kidney shutdown. You can decrease the dosage of cyclosporine to clear up the kidney failure and help fight the infection, but run the risk of organ rejection," he said. "Also, many of the drugs used to treat infection are nephrotoxic to the kidneys. It can quickly become a vicious cycle."
- The timing can affect the cost of a liver transplant. Lynne Evans, M.P.H., assistant administrator, University of Tennessee Medical Center, reported on a research project which tracked the costs of 55 liver transplant patients in the UTMC liver transplant program.

  Patients were divided into "complicated" and "uncomplicated" and, within these categories, graded according to their medical conditions prior to surgery: Grade I—stable condition and waiting at home for an organ to become available; Grade II—unstable, requiring hospitalization; and Grade III—unstable, requiring intensive care.

  For adults, Grade I uncomplicated cases stayed in the hospital an average of 28 days at an average cost of $60,000, while Grade III complicated cases required, on the average, 48 days of hospitalization at more than double the cost.

  "Clearly, it's better if the patient is referred early," Evans said. "The chance for survival increases dramatically and the financial burden is much less."

THE HEART PROGRAM

Until the advent of cyclosporine, heart transplantation was a very chancy procedure. Today, because of this drug and the further perfection of the surgical technique, some 60 percent of all heart transplant patients survive five years after transplantation.

In 1967, Dr. Christiaan Barnard performed the first successful cardiac transplant in Cape Town, South Africa. Cardiac surgeons throughout the world followed in his footsteps, performing more than 100 transplants in that first year. Among these was the first successful surgery in Chicago, performed by Hassan Najafi, M.D., chairman, cardiovascular surgery at Rush-Presbyterian-St. Luke's. However, since only a quarter of these patients lived for more than a few months, many cardiac surgeons—among them Dr. Najafi—abandoned cardiac transplants because of problems with organ rejection.

With the discovery of the anti-rejection drug cyclosporine in 1980, survival rates increased dramatically and now "cardiac transplantation is a viable treatment for end-stage cardiac disease," according to Dr. Najafi. "In the Medical Center's large and active existing programs of cardiology and cardiovascular surgery, such patients are already being seen. It's reasonable and logical that the Medical Center should offer this form of treatment as well."

Following more than a year of planning, protocol preparations and renovations to the surgical intensive care unit, the Rush cardiac transplant program became the fourth cardiac transplant program in Chicago and the 35th in the United States.

Coordinating cardiac transplant efforts are cardiologist Roger Billhardt, M.D., associate director of medical intensive care, and Dr. Najafi. Dr. Billhardt is the medical director of the program and Dr. Najafi, surgical director.

"We've modeled our program after the one at Stanford," Dr. Billhardt said. "They are the pros." (The Stanford University cardiac transplant program has performed heart transplants since 1968, under the direction of Norman E. Shumway, M.D., the foremost cardiac transplant surgeon in the United States.)

Potential cardiac transplant patients undergo a lengthy evaluation. They must have severe cardiac problems for which all medical and surgical therapies have been exhausted and a prognosis of less than six months to a year to live. Patients undergo a cardiac catheterization test and cardiac biopsy to determine the exact cause of the problem and to ensure that their lung capacity is sufficient to withstand transplant surgery.

Prior to the transplant, the many facets of the procedure and follow-up care post-transplant are thoroughly explained. "Patients must understand exactly what they are getting into," Dr. Billhardt said. "They must follow a strict medical regimen as well as dietary and exercise programs for the rest of their lives. We have to be sure our patients are able to understand and willing to follow the program."

Once a patient has been accepted into the program, the transplant team and the Organ and Tissue Recovery Program staff list the patient on the national computerized organ distribution system. Patients are listed according to severity of illness (Status Urgent I, II and III) blood type and weight range.

After a donor heart is located, members of the procurement team and Cyrus Serry, M.D., cardiovascular surgeon, fly to the donor hospital to procure the organ. Hearts can only be preserved for four hours (shortest time for any organ), necessitating precision-timed transfers between ambulances and airplanes.

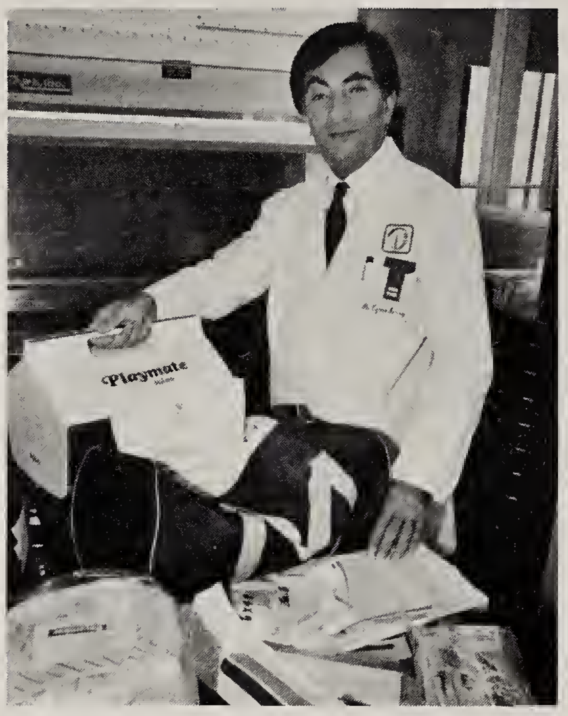
Once the preliminary preparations are completed, it takes ten to 15 minutes to remove a donor heart. Once removed, the heart is placed in 4°C (near ice cold), sterile solution for transportation back to the recipient hospital. Detailed attention to precise preparation of the organ; preservation of the integrity of the heart muscle; and its sterility are prerequisites for successful implantation. The entire heart of the donor is sutured to the back wall of the recipient heart.

Cardiac transplants are not as technically difficult as liver transplants, taking less than four hours to perform. The cardiac transplant surgeon removes the recipient's heart, leaving most of the receiving chambers (the right and left atria) in place.

Following the transplant, recipients spend 10 to 14 days in surgical intensive care in one of two rooms equipped with special air filters that reduce the chance of infection. Respiration and feeding tubes are removed as soon as possible to reduce that risk further.

Recipients start taking cyclosporine several hours prior to the transplant and continue this immunosuppressive regimen for the rest of their lives to prevent organ rejection. Other drugs designed to reduce the incidence or intensity of rejection are also administered.

On the fifth to seventh day after the transplant, a cardiac biopsy is performed to check for signs of rejection. If none are present, the recipient is moved to a special car-



Cyrus Serry, M.D., checks supplies used by the transplant team when procuring a donor heart.

diac transplant section on the general medicine floor.

Special precautions to guard against infection and rejection continue. All visitors and staff must put on a gown and mask before entering a patient room; patients wear a mask when they leave their rooms. Cardiac biopsies are performed at specific intervals to monitor for rejection.

Rehabilitation begins soon after the recipient is transferred to the general medical unit. Recipients participate in a progressive exercise program, held in the Medical Center's Cardiovascular Rehabilitation Unit. They also receive detailed instruction in nutrition and general hygiene, as well as on the medication regimen they must follow when they return home.

According to Dr. Billhardt, recipients remain in the hospital for about a month. They return to the Medical Center periodically for additional cardiac biopsies to monitor rejection and other tests and examinations to check on their general physical and emotional well-being.

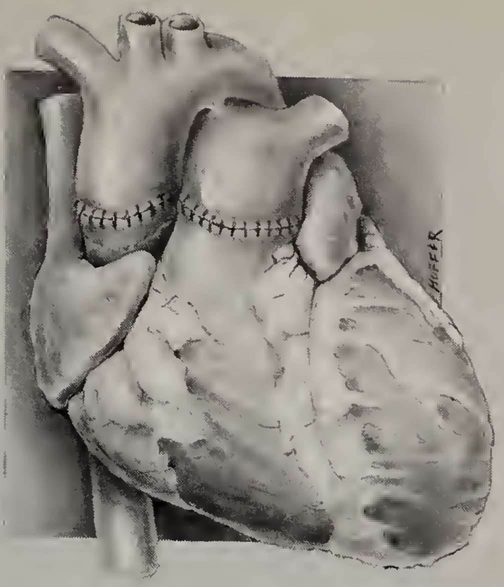
M.A.R.

Heart Transplant Surgeon Shares Experiences

In late fall, Norman E. Shumway, M.D., of Stanford University, the foremost cardiac transplant surgeon in the United States, delivered the 12th annual Ormand Julian, M.D., Ph.D., visiting lecture in cardiovascular-thoracic surgery at the Medical Center. In his talk he shared his experiences in heart and heart-lung transplantation with Medical Center cardiovascular surgeons and cardiologists. Dr. Shumway is chairman of cardiovascular surgery at Stanford University. Dr. Julian was the first chairman of cardiovascular-thoracic surgery at the Medical Center.

Among the points Dr. Shumway touched on in his lecture were:

- His experimental work in cardiac transplantation, begun soon after his arrival at Stanford in 1958, centered on developing a successful surgical procedure; providing a better understanding of the performance characteristics of the heart, including the effects of heart denervation; and defining the extent of organ rejection problems.
- The surgical method developed "left in place the inflow and outflow tracks of the heart" and replaced only the lower chambers of the diseased heart.
- Heart preservation techniques were developed which made it possible to preserve a heart up to four hours prior to implantation.
- Rejection presented a large problem. Soon after the 1965 discovery in Boston of 6-mercaptopurine, a drug with immunosuppressive properties, Dr. Shumway performed his first cardiac transplant on a dog, which lived one year. But rejection problems continued. During the 70s, azathioprine globulin with its immunosuppressive properties was discovered and percutaneous heart biopsy introduced. "But, the praise goes to cyclosporine," Dr. Shumway said. "This anti-rejection drug has revolutionized heart transplant."
- From January, 1968, through September, 1985, Dr. Shumway and his group have performed 384 transplants on 353 patients; of the 353, 201 have lived at least a year. In 1968, the one-year survivorship was 22 percent; by 1984-85, it had increased to 85 percent at Stanford.
- The Shumway group has recently become interested in transplanting younger patients, the majority with cardiomyopathy. This interest followed discovery that, after transplantation, donor cardiac tissue will grow and meet the physiologic demands of the maturing young person. Case in point: a piggyback transplant on an adult man who, needing a heart transplant immediately, received one from a 12-year old donor. Two years following the transplant, Dr. Shumway's team discovered the child's heart had grown and developed to meet the demand's of the adult body.
- From 1980-84, Dr. Shumway performed 18 transplants on patients under 18. Sixteen are still alive; 14 in school and two gainfully employed. He projects that of the 1,000 cardiac transplants performed in 1985 worldwide, 15 to 20 percent will have been on young adults under 18.
- In 1981 Dr. Shumway and his team began heart-lung transplants on humans. As of September, 1985, they had performed 28 heart-lung transplants on 27 patients, ranging in age from 20 to 45 years. The patients had either pulmonary hypertension or Eisenmenger's complex (a defect of the interventricular septum with severe pulmonary hypertension, plus



The donor heart is sutured to the back wall of the recipient heart during transplantation.

other complications). Severe pulmonary hypertension in both lungs makes breathing difficult and causes damage to the heart, necessitating both heart and lung transplants.

- "Because of the enormity of the (heart-lung transplant) surgery, there is clearly a higher immediate death rate in patients 30 days post-transplantation," Dr. Shumway said. "However, the survival statistics of heart-lung transplants compared to heart transplants (except for the immediate post-operative period) is very similar."

Facts and Figures:
Liver and Heart Transplantation

- The liver is the largest solid organ in the body. Eighty percent of the liver can be surgically removed and it will regenerate to normal size and function within three months. Yet humans cannot live for more than two days in the total absence of liver function.
- Five thousand Americans die annually of liver disease; many could be helped by a liver transplant. Liver transplant surgeons project that 1,000 liver transplant procedures will be performed in 1986.
- Liver transplants are considered the most technically difficult and complex of all the organ transplants. A liver transplant in an adult can take between 10 to 18 hours to complete and in children, six to 12 hours.
- One third of all liver transplants are performed on children. At any given time, 75 children are waiting for liver transplants; the majority have biliary atresia, a chronic deterioration of the liver caused by the scarring of bile ducts. One in 12,000 children is born with biliary atresia.
- At present, 70 percent of all children and 60 percent of adults are alive one year after liver transplantation; 60 percent of all heart transplant patients are alive five years after transplant.
- The heart is the simplest major organ in the human body, functioning as a pump to circulate blood to all parts of the body. This "simple" pump beats 40,000,000 times a year.
- Cardiac surgery is still in its infancy. The first successful heart operation of any kind was performed in 1945; by 1967, the science of cardiac surgery had developed to where successful cardiac transplantation was possible.
- Cardiac transplants are not as technically difficult as liver transplants, taking less than four hours to complete. What makes them potentially difficult is that donor hearts have the lowest preservation time (four hours) of all organs which can be transplanted.
- Cardiac transplant surgeons project that more than 1,000 cardiac transplants will be performed in 1986, 15 to 20 percent of them on children under 18 years old.
- Liver and heart transplants are possible in children because both transplanted organs will grow to meet the physical demands of the maturing child.
- The discovery of the anti-rejection drug cyclosporine in 1980 revolutionized transplantation. It must be taken by recipients post-transplant for the rest of their lives.
- The average cost nationally of a liver transplant is $150,000; a heart transplant, $70,000; and a kidney transplant, $35,000. At one time transplants were considered experimental, and therefore not covered by many insurance companies; many of these procedures have now become standard treatment for end-stage disease and are reimbursable by third-party payors.
- Of the 20,000 annual potential donors, only 2,000 actually become organ donors. One study showed nearly 50 percent of children died while waiting for a liver donor.

RushRounds

Medical Center Board Elects New Trustees

Three new trustees, Malachi J. Flanagan, M.D., John J. Schmidt, and the Rt. Rev. Frank Tracy Griswold III, have been elected to the Board of Trustees of Rush-Presbyterian-St. Luke's Medical Center. The announcements were made by Harold Byron Smith, Jr., Board chairman.

Dr. Flanagan, president of the Medical Center's medical staff, is a professor of urology, Rush Medical College, and a senior attending physician in the Department of Urology, Presbyterian-St. Luke's Hospital.

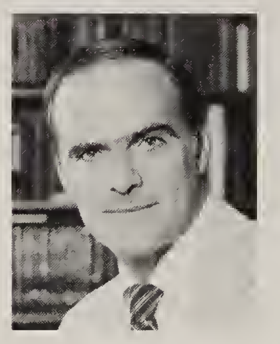
Schmidt is chairman and chief executive officer of Santa Fe Southern Pacific Corporation and has been associated with Santa Fe Industries, Inc., since 1955. In 1978 he was appointed president and in 1984 assumed his present position.

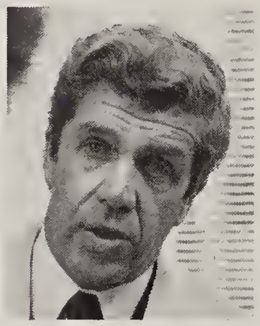
Prior to joining Santa Fe Industries, Schmidt was a trial attorney for the Atchison, Topeka and Santa Fe Railway from 1955 to 1969. He is a member of the Chicago, Illinois and American Bar Associations, the Society of Trial Lawyers, the Illinois Defense Council, and the National Association of Railroad Trial Counsel.

Schmidt received his bachelor of science degree from DePaul University in 1951 and his J.D. from Loyola University in 1955.

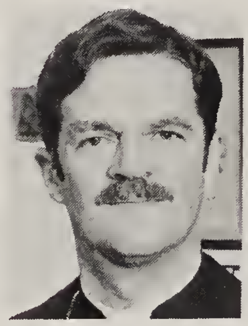
Bishop Griswold is the bishop co-adjutor of the Episcopal Diocese of Chicago. He was ordained and consecrated bishop co-adjutor in March, 1985. He received his bachelor of arts degree from Harvard University and a bachelor's and master's degree in theology from Oxford University. He was ordained a priest in 1963 and had served parishes in Pennsylvania before coming to Chicago earlier this year. He is the author of a number of published works, including several for the National Committee on the Family of the Episcopal Church, the Seabury Press, Trinity Institute and the Forward Movement Publications.

David Dangler


Marshall Field


Malachi J. Flanagan, M.D.

David W. Grainger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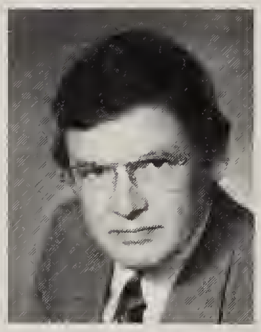
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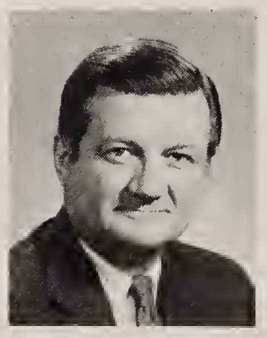

B. Kenneth West

Named life trustees were B. Kenneth West, Edward McCormick Blair, Augustin S. Hart, Jr., Clayton Kirkpatrick, the Rt. Rev. James W. Montgomery and George V. Meyers. Blair, senior partner of William Blair & Company and a past chairman of the trustees, has been a trustee since 1961; Hart is former vice chairman of the Quaker Oats Company and a trustee since 1964; Kirkpatrick is former chairman and chief executive officer of the *Chicago Tribune* and a trustee since 1976; Bishop Montgomery is Bishop of the Episcopal Diocese of Chicago and a trustee since 1970; Myers is former president and chief operating officer, Standard Oil Company (Indiana) and a trustee since 1970.

The Board also authorized Messrs. Blair and Kirkpatrick to continue as members of the Executive Committee by a special vote designating them annual trustees as well. D.W.

$3 Million Gift For Bone Marrow Center

The Coleman/Fannie May Candies Foundation, Inc., of Chicago has made a $3 million gift to the Medical Center's bone marrow transplant program. It was announced at the September 11 meeting of the Medical Center's Board of Trustees.

In recognition of the gift, the Trustees of the Medical Center named the unit The Thomas Hazen Thorne Bone Marrow Transplant Center of Rush-Presbyterian-St. Luke's, honoring the memory of a former director of the Foundation who died of leukemia at the age of 32.

The gift also provides for an endowment which permitted the Trustees to establish The Coleman/Fannie May Candies Foundation Professorship for the director of the bone marrow transplant center. Herbert Kaizer, M.D., Ph.D., was named to this chair at the same meeting.

John E. Hughes, president, and Jean D. Thorne, executive director of the Coleman/Fannie May Candies Foundation, Inc., made the presentation to the Trustees. The decision of the Foundation will permit the next stage of implementation of a $10 million plan to expand the bone marrow transplant center from six to 15 beds and from a staff of six medical specialists and scientists to 25 by 1990. Construction is expected to begin in 1987. Six new research laboratories will also be created in an expanded research program.

The Rush bone marrow transplant center, which opened in November, 1983, treats patients with forms of leukemia that don't respond to chemotherapy, aplastic anemia, severe combined immunodeficiencies, and other disorders of the blood. In these often-fatal diseases, the patient's bone marrow cannot make healthy red and white blood cells, leaving the patient susceptible to infection.

During a bone marrow transplant the patient's diseased marrow is suctioned from the cavities in the skull, vertebrae, ribs, and pelvic and pectoral girdles. After any remaining diseased cells are eliminated, new healthy marrow is injected back into these cavities.

Research in the center focuses on three critical areas: autologous transplants, in which the patient's own bone marrow is removed during a period of remission and re-implanted when needed; allogenic, or donor, transplants, which require the donor and patient to possess matching genes located on a specific pair of chromosomes; and improved pre-transplant treatment for various malignancies.

Specialties of the staff of the bone marrow transplant center include hematology, oncology, internal medicine, pediatrics, immunology, blood component therapy, pathology, infectious diseases, cytogenetics and psychology.

Thirty-two transplants have been done at Rush since the center opened. In addition, bone marrow is being stored for 18 patients in case they have a relapse and need a new transplant. K.H.

Officers of Coleman/Fannie May Candies Foundation, Inc., Jean D. Thorne, executive director, and John E. Hughes, president, with Herbert Kaizer, M.D., Ph.D., the Coleman/Fannie May Candies Foundation professor.

Name New Chairman of Pediatrics

Samuel P. Gotoff, M.D.

Samuel P. Gotoff, M.D., is the new chairman of pediatrics at Rush-Presbyterian-St. Luke's Medical Center. He succeeds Joseph R. Christian, M.D., who retired in 1985.

Dr. Gotoff has been professor of pediatrics at the Pritzker School of Medicine of The University of Chicago and chairman of the department of pediatrics at Michael Reese Hospital and Medical Center since 1973.

A consultant on infectious diseases and immunologic disorders in children, Dr. Gotoff is internationally known for epidemiologic and immunologic studies on group B streptococcus, the major bacterium responsible for serious infections in newborn infants. He is a member of numerous academic and professional societies and has trained over 200 pediatric residents, many of whom are practicing pediatricians in the metropolitan Chicago area.

Dr. Gotoff is a native of New York City and earned his bachelor's degree at Amherst College in Massachusetts, and his M.D. degree from the University of Rochester School of Medicine, Rochester, New York. He is board-certified in pediatrics and allergy/immunology, and has served as a medical epidemiologist in the U.S. Public Health Service. He has published more than 80 scientific articles and is an editor of *Pediatric Infectious Disease* and *Infection*.

In addition to serving as chairman of pediatrics, Dr. Gotoff will hold the rank of professor in the department.

Medical Staff Names Officers

Malachi J. Flanagan, M.D., professor and senior attending physician, Department of Urology, has been elected the new president of Rush-Presbyterian-St. Luke's Medical Center's 859-member medical staff.

Other officers are James A. Schoenberger, M.D., president-elect; Frank R. Hendrickson, M.D., secretary; and Norbert J. Nowicki, M.D., treasurer.

As president, Dr. Flanagan will serve as a member of the Executive Committee and as a Trustee of the Medical Center.

Dr. Flanagan, a graduate of the Loyola University Stritch School of Medicine, has been with the Medical Center since 1968. A former president of the Chicago Urological Society and the Illinois State Urological Society, Dr. Flanagan is a member of the Chicago Medical Society, the Illinois State Medical Society and the Society of University Urologists.

He is also a principal investigator on the National Bladder Cancer Project, which involves the collaborative efforts of nine other institutions nationally who hope to control the high incidence of bladder cancer through improved treatment and care.

James A. Schoenberger, M.D., president-elect, is professor and chairman of the Department of Preventive Medicine and professor of internal medicine. He received his medical degree from The University of Chicago. After completing his internship at Beth Israel Hospital, Massachusetts, and his medical residency at The University of Chicago, he was a fellow in medicine at the University of Illinois.

New medical staff president Malachi J. Flanagan, M.D., (l) receives gavel from past president Andrew Thomson, M.D.

A past president of the Chicago Heart Association and the American Heart Association, Dr. Schoenberger is a heart specialist of international repute, having directed major clinical studies on the relationships between smoking, fitness, diet, hypertension, heart disease and stroke. One such study was the Multiple Risk Factor Intervention Trial (MRFIT)—designed to identify men at a high risk of having a heart attack because of their cholesterol count, high blood pressure or cigarette smoking. Dr. Schoenberger is currently planning to establish an Alzheimer's Disease Clinical Program which will offer complete medical evaluation for the illness and patient management planning as well as conduct research on senile dementia.

Frank R. Hendrickson, M.D., secretary, is professor and chairman of the Department of Therapeutic Radiology, and a senior attending physician. A graduate of Jefferson Medical College, Philadelphia, he completed his internship and residency at Jefferson Medical College Hospital. Dr. Hendrickson joined the Medical Center staff in 1956. He directs the Neutron Therapy Facility at the Fermi National Accelerator Laboratory in Batavia, where cancer patients are treated with neutron beams, which have been found to be effective in destroying certain cancers.

Norbert J. Nowicki, M.D., treasurer, is assistant professor, Department of Ophthamology. He received his medical degree from the Loyola University Stritch School of Medicine. He completed his internship at St. Mary of Nazareth, Chicago, and his residency at the University of Illinois Research and Education Hospital and at Rush-Presbyterian-St. Luke's. Dr. Nowicki is a senior attending physician and has been a member of the Medical Center staff since 1960. D.W.

Nursing Staff Names Officers

Sandra McFolling, R.N. is the new president of Rush-Presbyterian-St. Luke's Medical Center's 1,400 member professional nursing staff (PNS). Other officers are William Weissner, R.N., president-elect; Priscilla Lynch, R.N., secretary; and Penny Duszynski, R.N., treasurer. PNS, established in 1984, is one of the first organizations of its kind in the country.

McFolling, a 1977 graduate of Northern Illinois University, DeKalb, has been a member of the Medical Center staff since 1977. She holds appointments in the departments of psychiatric and gerontological nursing, and is a discharge planning nurse.

In her role as president, McFolling coordinates nursing staff efforts to provide quality health care for patients, promote high nursing standards, and evaluate nursing procedures through peer review.

President-elect William Weissner is a medical nurse in the Medical Intensive Care Unit. A 1972 graduate of Elmhurst College, he received his nursing degree from Moraine Valley College, Palos Hills. Weissner joined the Medical Center staff in 1982.

Priscilla Lynch, the new secretary, is assistant professor of psychiatric nursing and a practitioner/teacher in the Departments of Psychiatric Nursing and Medical Nursing. She received her M.S.

degree from Saint Xavier College, Chicago, and her nursing degree from the University of Wyoming.

Penny Duszynski, the treasurer, is the assistant head nurse for the Post-Anesthesia Recovery Room. A 1965 graduate of the College of St. Francis (Joliet), Duszynski received her nursing degree from the Mount Sinai Hospital School of Nursing, Chicago, and her M.B.A. from Loyola University. D.W.

Nursing staff officers: William Weissner, R.N.; Sandra McFolling, R.N.; Penny Duszynski, R.N., and Priscilla Lynch, R.N.

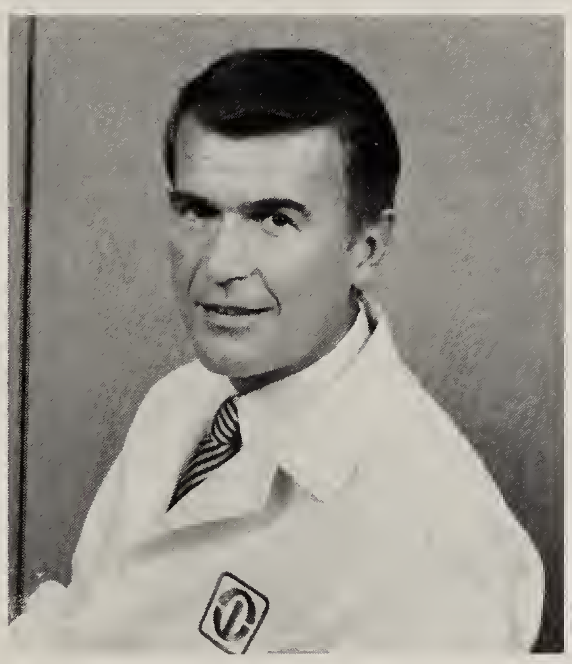
Rush Endowed Chairs Now Number 33

Four physicians on the Medical Center's staff were named to endowed professorships at Rush University during 1985. The appointments include newly established chairs in anesthesiology and bone marrow transplantation, as well as chairs in internal medicine and surgery. In addition, the Woman's Board established a chair in child psychiatry, bringing to 33 the total number of endowed chairs in the University. Newly appointed named professors include:

Anthony D. Ivankovich, M.D.: the William Gottschalk, M.D., professor of anesthesiology.

Dr. Ivankovich is professor and chairman of anesthesiology at the Medical Center and directs patient care efforts as well as research and training programs in the department, one of the oldest at Rush. He is also director of the Rush Pain Center.

Prior to joining the Medical Center staff, Dr. Ivankovich was chairman of the department of anesthesiology at Illinois Masonic Medical Center. Born in Yugoslavia, he received his M.D. degree from the University of Zagreb Medical School and, following a residency in internal medicine in West Germany, he came to the United States. He completed his anesthesiology residency at The University of Chicago Hospitals and Clinics in 1968.



Anthony D. Ivankovich, M.D.

He has been on staff at Michael Reese Hospital and Medical Center and the Shriner's Hospital for Crippled Children, and has held faculty appointments at a number of institutions including The University of Chicago Pritzker School of Medicine and Loyola University's Stritch School of Medicine.

He is a past president of the Illinois Society of Anesthesiologists, and the author of two books on anesthesiology, as well as over 70 scientific papers. Neurosurgical and cardiovascular anesthesia are among his research interests, as well as the treatment of pain and the development of artificial red blood cells.

The late William Gottschalk, M.D., for whom the chair is named, was associate chairman of the Department of Anesthesiology and a noted authority in anesthesiology and obstetrics and gynecology.

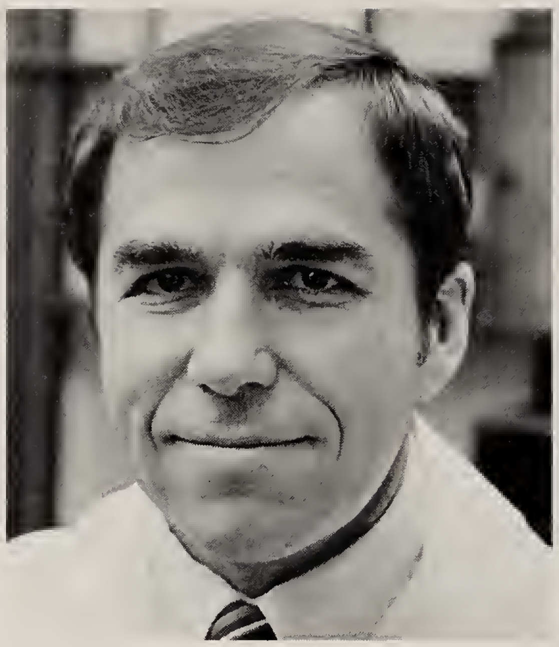
Roger C. Bone, M.D.: the Ralph C. Brown, M.D., professor of internal medicine.

Dr. Bone is the first holder of the Brown Chair, established in 1970 by family and friends of Dr. Brown, an authority in the field of gastroenterology, a graduate of Rush Medical College, and a member of the Presbyterian Hospital medical staff until his death in 1954.

Dr. Bone joined the Medical Center staff in 1984 as chairman of the Department of Internal Medicine, the largest single department within the Medical Center. A recognized specialist in pulmonary and critical care medicine, he was professor of medicine at the University of Arkansas for Medical Sciences, and chief of the pulmonary division at that institution and the Veterans Administration Complex.

A native of Little Rock, Arkansas, Dr. Bone received his B.A. degree from Hendrix College in Arkansas

RushRounds



Roger C. Bone, M.D.

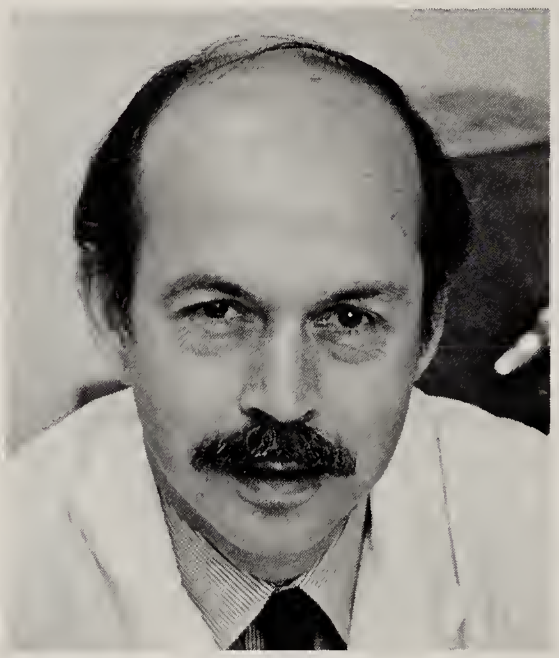
and his B.M.S. and M.D. degrees from the University of Arkansas Medical School. He completed his internship and residency in medicine at the Parkland Memorial Hospital in Dallas, Texas, and was a fellow in the internal medicine department (cardiopulmonary section) at the University of Texas Southwestern Medical School.

A recipient of many academic and teaching awards, Dr. Bone is author of more than 150 scientific articles and has edited five books on respiratory diseases. A respected educator, he was elected to receive the Outstanding Teacher "Golden Apple Award" at the University of Arkansas Medical Center on three occasions. Rush medical students have also honored him; 1985 graduates chose him to serve as their hooder at commencement ceremonies.

James W. Williams, M.D.: the Jack Fraser Smith professor of surgery.

Dr. Williams, one of the foremost liver transplant surgeons in the midwest, is director of the Section of Transplantation at the Medical Center. He was formerly associated with the liver transplantation program at the University of Tennessee Medical Center, which he helped develop into the second largest in the country.

A graduate of Memphis State University, Dr. Williams received his M.D. degree from the University of Tennessee Medical School. Following a general surgery residency at the City of Memphis Hospitals, he took a fellowship in liver transplantation at the University of Colorado Transplantation Service, Denver, Colorado, under the direction of Thomas Starzl, M.D. Dr. Starzl, a pioneer in liver transplantation in the United States, now directs the country's largest program at the University of Pittsburgh/Pittsburgh Children's Hospital.



James W. Williams, M.D.

While at Tennessee, Dr. Williams concentrated his research efforts on the evaluation of cyclosporine, an immunosuppressive drug used to reduce the chances of organ rejection. His initial research efforts at the Medical Center focus on increasing the length of time the liver can be preserved; to date, livers outside the body can only be preserved for a limited number of hours, reducing the distance procurement teams can travel to obtain these organs.

The Jack Fraser Smith Chair of Surgery was established in 1974 by Bertha Spaeti Smith, in memory of her husband, to recognize and honor outstanding physicians and surgeons in the Department of General Surgery.

Herbert Kaizer, M.D., Ph.D.: the Coleman/Fannie May Candies Foundation professor and director of The Thomas Hazen Thorne Bone Marrow Transplant Center.

A $3 million gift to the Medical Center from The Coleman/Fannie May Candies Foundation, Inc., of Chicago, established this professorship.

Herbert Kaizer, M.D., Ph.D.

Dr. Kaizer, the first to hold the chair, is well-known for his work in autologous transplantation, using the patient's own bone marrow. He joined the staff of the Medical Center in 1983, and is on the faculty of the departments of immunology/microbiology, internal medicine and pediatrics. The Thomas Hazen Thorne Bone Marrow Transplant Center, which he heads, was established under his leadership.

Dr. Kaizer, holds a Ph.D. degree in psychology from Boston University, and an M.D. degree from Stanford. He held academic appointments in microbiology, pediatrics and oncology while working in the field of bone marrow transplantation at The Johns Hopkins University.

The Woman's Board Chair of Child Psychiatry: Last year the Woman's Board of Rush-Presbyterian-St. Luke's voted to fund a professorship in child psychiatry as an expression of its concern for this important subspecialty of medicine. The establishment of the Woman's Board Chair of Child Psychiatry will make possible the development of innovative treatment programs, new research and increased training opportunities.

Proceeds from the 1985 Woman's Board Fashion Show, "Fashion Fantasy," helped fund the chair.

This is the Board's second commitment to an endowed chair. In 1968 the Board established the Woman's Board Chair of Pediatrics, the first hospital-based endowed chair of pediatrics in the nation and the first major endowment by the Woman's Board. J.P.

Medical Center Signs Affiliation Agreements

In 1985, Rush-Presbyterian-St. Luke's Medical Center signed affiliation agreements with MacNeal Hospital of Berwyn and Marianjoy Rehabilitation Center of Wheaton. The affiliations bring to 17 the number of hospital and patient care institutions in the Rush System for Health.

MacNeal Hospital

The affiliation agreement between MacNeal Hospital and Rush-Presbyterian-St. Luke's provides for the development of clinical, academic and research programs between the two institutions.

The affiliation announcement, made jointly by Luke McGuinness, president of MacNeal Hospital, and Leo M. Henikoff, M.D., Medical Center president, said:

"This step strengthens the capacity of MacNeal as a full-service community hospital with a superb medical staff to improve care in that setting while providing for continuity of care and subspecialty ties with Rush-Presbyterian-St. Luke's Medical Center."

Under the agreement, all hospital interactions will be governed by committees with equal representation from management staffs of both hospitals. While this affiliation is not a merger, it is a much closer linkage of education, research and patient care programs than is usually developed in affiliation agreements.

The agreement establishes a mechanism for a tertiary care institution—Rush-Presbyterian-St. Luke's—and a full-service community hospital with a respected medical staff—to share responsibility for the delivery of certain subspecialty care in the communities served.

The affiliation also provides for the election of medical staff members from Rush-Presbyterian-St. Luke's to the MacNeal staff and from the MacNeal staff to Rush, adhering to the by-laws and review procedures of the respective institutions.

"The example we hope to give the nation is one in which membership on two medical staffs can find ways to bring the expertise of the academic health center and make it available in a community hospital, strengthening the capacity for service by the hospital and its medical staff," the joint announcement said.

The Medical Center and MacNeal have worked together prior to this new affiliation. For the past two years they have operated a joint venture in cardiology that assisted MacNeal in recruiting a cardiology staff and provided cardiac referrrals by MacNeal to Rush-Presbyterian-St. Luke's in cases where tertiary care was indicated.

At MacNeal signing (l. to r., front row): Luke McGuinness, president and chief executive officer, MacNeal Hospital, and Leo M. Henikoff, M.D., RPSLMC president. (Back row) Andrew Thomson, M.D., past president, RPSLMC medical staff; Avery Miller, associate vice president for interinstitutional affairs, RPSLMC; Peter Giammanco, Jr., chairman, MacNeal Hospital board of directors; Harold Byron Smith, Jr., chairman, RPSLMC Board of Trustees; Robert S. Kaminski, M.D., president, MacNeal medical/dental staff; Harold S. Firfer, D.D.S., vice president of interinstitutional affairs, MacNeal.

The concept is the first of its kind among the hospital affiliations already established by the Medical Center.

MacNeal Hospital is a 427-bed teaching hospital, offering a broad range of community health services. The 60-year old hospital, located in Berwyn, a Chicago suburb, services a population base of 300,000 in the near western suburbs.

Marianjoy Rehabilitation Center

Marianjoy Rehabilitation Center and the Medical Center signed an enabling affiliation agreement to foster clinical and academic activities between both institutions.

The announcement was made jointly by Dr. Henikoff and Bruce A. Schurman, president of Marianjoy.

"There have been dramatic advances in physical medicine and rehabilitation and in the administration of rehabilitation services in recent years. Marianjoy has been in the forefront of these changes," said Dr. Henikoff. "We're pleased that Marianjoy is joining the Rush network and we look forward to increased collaborative efforts in rehabilitation medicine throughout the network."

Both Rush and Marianjoy aim to upgrade expanding education opportunities in medicine as well as related health care fields. Along these lines, Marianjoy will combine resources with Rush to participate in joint research activities, utilizing and relying on the areas of expertise particular to each institution.

Marianjoy and Rush will continue to be independent, autonomous institutions with separate governing boards and with sole responsibility for the quality of patient care delivered by the members of the medical staff in each institution. The affiliation provides for the election of a common Board member of both institutions in order to facilitate the relationship between the two institutions.

A member of the Wheaton Franciscan Services, Inc., Marianjoy is a freestanding physical rehabilitation center providing diagnostic services and programs to individuals suffering the residual effects of birth defects, serious illnesses and traumatic accidents. In addition to providing direct clinical services to the communities it serves, Marianjoy provides significant educational and training experiences for students of the health professions—mainly to the allied health sciences—and is currently affiliated with more than 30 colleges and universities across the country. J.P.

Leo M. Henikoff, M.D., (l) RPSLMC president, shakes hands with Bruce A. Schurman, president of Marianjoy Rehabilitation Center, at affiliation announcement.

ANCHOR'S New Head Predicts Future Growth

Although in Chicago there are now more than 20 health maintenance organizations vying for the attention of area employers, ANCHOR, the Chicago-based, HMO of Rush-Presbyterian-St. Luke's Medical Center is expanding and forecasting a membership increase to 145,000 by December, 1986. ANCHOR is the second-largest HMO in the Chicago area. Currently it has 123,000 members and serves some 1,200 private and public employers.

According to William E. Gold, Ph.D., the newly-named president of ANCHOR and vice president for Prepaid Health Programs at the Medical Center, ANCHOR is very well-positioned to compete strongly in the present highly competitive, volatile market. "We have a large, loyal membership which trusts us to provide high quality health care—and to spend their money wisely," he says.

Dr. Gold came to ANCHOR in 1985 after 10 years as director of the Blue Cross and Blue Shield of Greater New York HMO, where he was responsible for its strong financial position and building membership to its present 55,000 enrollees. He succeeded Nathan Kramer who headed ANCHOR since its inception. Dr. Gold holds the Ph.D. in hospital and health care administration from the University of Minnesota.

ANCHOR, founded in 1971, has grown steadily. During the past year, ANCHOR opened four new offices. The most recent—the 18th ANCHOR site—is located in Merrillville, Indiana, and is the first out-of-state ANCHOR location.

Dr. Gold has also announced that ANCHOR Central, the office on the Medical Center campus which serves some 40,000 members, will be re-locating in late 1986 to the five-story Triangle Office Building, now under construction on a site just north of the Medical Center. "This office will provide a showcase for those who want to see a full-function health maintenance organization near the downtown Chicago area," Dr. Gold says. Dr. Gold's plans also include strategies concerned with cost-effective ways to provide comprehensive health care to a growing membership, including the possibility of sharing services between various ANCHOR offices.

ANCHOR is now a member of The HMO Group, a nationwide network of 13 not-for-profit HMOs. This membership will give greatly increased visibility to ANCHOR, facilitate sharing of information in a variety of areas, and will include ANCHOR in a national marketing program to large corporations.

"Our HMO gives people a choice about something very important in their lives—how they receive their health care," Dr. Gold said. "I believe each of us can and does make a difference in the service our members receive. I have confidence that our committed staff and responsive management will carry us through both the easy and the hard times."

C.E.

Rush Program Aids Troubled Children

Until the late 70s, many mental health professionals did not accept the fact that children could become depressed just like adults. Today, however, it is estimated that of the 11 percent of American children who have some type of mental problem, about five percent suffer from depression.

The Section of Child Psychiatry, under the direction of child psychiatrist Elva Poznanski, M.D., professor of psychiatry, recently opened a 14-bed inpatient program, specializing in the diagnosis and treatment of childhood depression and related affective disorders. The program serves children, ages 5-14 years.

Says child psychiatrist, Linda Freeman, M.D., assistant professor of psychiatry and medical director of the program: "We spent more than a year developing the children's inpatient unit. It is designed to respond quickly to the troubled child's behavioral, educational, medical and familial problems."

The result is a comprehensive blend of medical, psychiatric, educational and psychological evaluation and treatment programs which can serve children with severe emotional problems (depression, psychosis, autism, conduct disorders, eating disorders) and those who have a diagnosis of both psychiatric and medical problems (diabetes, epilepsy, respiratory problems). There are specially equipped rooms on the unit for handicapped children and to monitor those with chronic medical conditions.

During the child's four- to eight-week stay in the hospital, the child and family are evaluated and a therapy plan is developed.

"It's a family-oriented program," explains Kate Mayton, M.S., R.N., unit leader of the program and instructor, College of Nursing. "Family participation in our activities is encouraged to help parents understand their children's problems better and begin to enjoy their children again."

Children feel more comfortable with the predictable, so a good portion of time is spent on routines which mimic home life. The morning routine, which includes getting dressed and eating breakfast in the dining area on the unit, is followed by school work in the classroom, also located on the unit. The children spend five hours a day in classes taught by teachers certified in learning disabilities and behavior disorders. Afternoon classes are interspersed with occupational therapy and physical activities, both of which are held in the unit's activities and exercise rooms.

After-dinner activities include time for homework, a structured occupational therapy activity, snacks and storytime before bed.

The routines are only interrupted for diagnostic evaluations and therapy sessions. According to Dr. Freeman, many of these children and their families sought help at several treatment centers before coming to Rush. "These children have multiple problems which need sorting out," she says. "Our diagnostic evaluations can include a physical examination, neurological assessment, sleep disorders and endocrine studies by Medical Center specialists as well as in-depth child and family psychiatric assessments by our child psychiatrist and family therapist."

Treatment can include individual psychotherapy, family therapy, medication management, sensory integration therapy, and speech and language therapy.

"Our children have often had emotional problems for a long time and have missed out on so much of their childhood," says Dr. Poznanski. "The inpatient program provides a neutral setting for these children where they can calm down and get some routine and order back into their young lives."

Cardiology Award Funds Innovative Curriculum

"Heart disease remains this country's number one killer (over 700,000 people every year), yet preventive cardiology is not taught in a systematic way at most medical schools," says Philip R. Liebson, M.D., associate professor of internal medicine and preventive medicine, Rush Medical College, and chief of the Cardiac Graphics Laboratory, Section of Cardiology.

An American Heart Association "Teacher of the Year" in 1985, Dr. Liebson has been a Rush Medical College faculty member for 13 years. Now, because of a $724,500 award from the National Heart, Lung and Blood Institute of the National Institutes of Health, he will be able to develop and implement a medical education curriculum and research structure in preventive cardiology over a five-year period.

"The Preventive Cardiology Academic Award to Rush-Presbyterian-St. Luke's Medical Center will enable us to develop a comprehensive preventive cardiology curriculum which will span all four years of a student's medical education and beyond," said Dr. Liebson, who is one of only four recipients in the country to receive the award this year.

Particular emphasis will be on the clinical clerkships of internal medicine, family practice, pediatrics and surgery. Also, new courses and new material for existing courses will be developed to cover the pre-clinical years and also postgraduate education for resident physicians and attending staff.

Beginning with the 1986 freshman medical school class, a longitudinal study of heart disease risk factors will be initiated. Entering students will be asked to fill out a risk factor profile and general knowledge questionnaire about heart disease prevention, and then to track their own risk factors, such as blood pressure, serum cholesterol level, smoking and eating habits, physical activity and stress, throughout their school years.

"Students will be able to compare their own findings with current studies and any new findings in the areas of heart disease treatment and prevention," Dr. Liebson explained. "We hope that participation in the study (which is voluntary) will dramatically heighten the students' awareness of and appreciation for preventive cardiology."

The Preventive Cardiology Academic Award also provides support for research. Funding will be provided for summer student fellowships and for a study of hypertension, its cardiac consequences and risk factor modification by junior and senior medical students. According to Dr. Liebson the increased funding for research will enhance cooperation among medical school faculty and students in the ongoing study of preventive cardiology.

The first Preventive Cardiology Academic Award was presented in 1979. Since that time 29 individuals have received the award. This year, in addition to Dr. Liebson, awardees include researchers at the University of California at San Diego, the State University of New York—Downstate Medical Center, and the University of North Carolina at Chapel Hill.

At Rush an internal advisory committee medical school faculty will evaluate and guide the award program. C.E.

Cancer, Osteoporosis Focus of New Centers

Three new diagnostic and treatment centers were opened at the Medical Center during 1985. They are—the Pigmented Lesion Center, the Osteoporosis Prevention and Treatment Center, and the Comprehensive Diagnostic Center for Breast Disease.

- The first of its kind in the Midwest, the Pigmented Lesion Center provides regular screenings to detect melanoma, a fatal skin cancer, which is especially curable in the early stages. The Center utilizes a multidisciplinary approach involving the expertise of surgeons, radiation therapists and oncologists.

People at risk of developing melanoma include those with oddly shaped or changing moles and those with dysplastic nevus syndrome (in which hundreds of moles are present all over the body). About 4.5 million people in the United States may have the dysplastic nevus syndrome and, although melanomas can occur in people of any coloring, those at a high risk are people of Celtic heritage, those who are fair-skinned, blonde or red-headed, blue-eyed, or who sunburn easily.

According to statistics, nearly 20,000 people are diagnosed with melanoma each year. Its incidence is increasing at a rate second only to lung cancer, largely because of the emphasis on suntanning in the past few decades.

In addition to diagnosing melanomas and tracking suspicious moles, the Pigmented Lesion Center trains area doctors and nurses to recognize the disease.

The center is under the direction of Janet Wolter, M.D., oncologist and professor of medicine, Rush Medical College.

- The Osteoporosis Prevention and Treatment Center screens women for porous bones, advises them on preventive measures and medically treats osteoporosis—a "silent bone thief" that has become a major health concern for post-menopausal women over 50. Decreased estrogen (the female sex hormone), lifelong low calcium intake, lack of exercise and small stature are suspected reasons for why osteoporosis develops.

The Center offers three types of service: screening for osteoporosis risk and advice on avoiding the development of the disorder for menopausal women; evaluation and treatment of early osteoporosis (suspected low bone density) for post-menopausal women who have not sustained a vertebral fracture; and, evaluation and treatment regimens for women with established osteoporosis and back pain (usually caused by vertebral fracture).

Under the direction of Will G. Ryan, M.D., associate director, Section of Endrocrinology and Metabolism, and professor, internal medicine, the Center's staff includes endocrine (hormone) specialists, orthopedists, a rheumatologist (joint specialist), gynecologists, nutrition experts and physical therapists.

- The services of the Comprehensive Diagnostic Center for Breast Disease include screening for cancer, comprehensive evaluation and treatment recommendation. Evaluation also is available for women who do not have cancer but think they are at high risk.

Since treatment for breast cancer (surgery, radiation, etc.) usually depends on which specialist a patient sees first, the center uses an unbiased approach with each case evaluated by a surgeon, radiation therapist and oncologist. Together, these specialists offer the patient the latest information on the various options available as well as a joint recommendation on the most appropriate treatment for the specific case.

Heading up the program are Albert K. Straus, M.D., assistant professor, general surgery, and Samuel G. Taylor IV, M.D., associate professor, internal medicine. D.W.

Janet Wolter, M.D., (center) examines patient in Pigmented Lesion Center as William Leslie, M.D., observes.

Rush Medical College Honors Samuel Taylor

Samuel G. Taylor III, M.D., one of the first clinicians in the country to recognize the potential importance of hormones in cancer treatment, was this year's recipient of the Rush Medical College Alumni Association's highest honor.

A member of the class of '32, Dr. Taylor received the 1985 Distinguished Alumnus Award at the traditional commencement banquet in June, where he was recognized for "his outstanding accomplishments in medical oncology as a nationally renowned pioneer, educator and compassionate clinician."

The Rush alumnus is a specialist in endocrinology and emeritus professor of medicine at his alma mater.

For nearly 20 years Dr. Taylor headed Rush-Presbyterian-St. Luke's Section of Medical Oncology, established in the Department of Medicine in 1954 as a result of his interest in innovative cancer therapies. Today the section is one of the oldest medical oncology groups in the country and remains among the most active participants in cooperative clinical trials nationwide.

A noted leader in medical oncology, Dr. Taylor was a trustee and consultant to the National Cancer Institute; advisor to the Cancer Control Program; chairman of the Committee on Cancer of the American College of Physicians; president of the Illinois Cancer Council; and director of the Cancer Council Comprehensive Cancer Center Program.

In 1978, the Samuel G. Taylor III, M.D., Chair of Oncology was established in his honor at Rush University. KK-K.

1985 Rush Medical College Distinguished Alumnus, Samuel G. Taylor III, M.D.

Expand Services for the Elderly

The Medical Center's geriatric facility—the Johnston R. Bowman Health Center for the Elderly—significantly expanded its services to the elderly over the past few months.

The first of the new programs now in place at the Bowman Center is the Geriatric Assessment and Planning Service, designed to help older people and their families evaluate the many changes that accompany aging and make the most appropriate plans.

The program provides assistance to older men and women experiencing physical, emotional and social functioning difficulties, including a decline in physical or mental health, confusion, an inability to perform basic self-care activities, loss of weight or appetite, change in sleep patterns or simply "a failure to thrive," says Anna Perlberg, A.C.S.W., director, social rehabilitation, Johnston R. Bowman. "It's not strictly medical needs—it's whatever concerns the family."

The assessment begins with a visit to the client's home, if possible, by geriatric clinical specialist Pamela Steinbach, M.S., R.N., and geriatric social worker Wendy Asselin, A.C.S.W. At this interview they talk with the client and family. The purpose is to assess the client's functional abilities, such as dressing, mobility and meal preparation; discuss relationships, needs and desires; and examine the living environment to identify potential problems. They also take blood samples from the client for lab tests which may indicate health problems.

Following this initial visit, an appointment is scheduled with the third member of the service team, Philip Freedman, M.D., professor, internal medicine. He performs a medical evaluation, reviews the laboratory findings and answers any health-related questions from the client and family. If needed, a psychiatrist and other specialists are available for consultation.

The result of these assessments, according to Perlberg, is a total picture of the client's home environment, family relationships, social activities, health and ability to cope with chronic illnesses as well as the tasks of daily life.

Drawing on these reports, the service team assists client and family to select an optimal living arrangement—for instance, alone, with a family member, or in a nursing home—and arranges for support services and activities. Often, the client can stay in the home aided by support services that cost far less than a nursing home.

Members of the assessment team in conference: Wendy Asselin, A.C.S.W., and Philip Freedman, M.D.

The program is not designed to supplant the ongoing physician-patient relationship. The client's primary physician receives a full copy of the assessment team's report and provides any medical care needed.

"Traditionally, there is a real split between the medical system and community-based social services. Older people and their families need an integration. We hope to provide that," Perlberg says.

A second new program, the Outpatient Evaluation and Prosthetic Fitness Service, helps elderly patients who have lost a limb to remain as self sufficient as possible. The service offers a biweekly outpatient clinic, staffed by a team of physical therapists, physiatrists, and a representative of a prosthetics company.

The team educates amputee patients about the selection and care of a prosthesis; evaluates whether the patient has healed sufficiently to get a prosthesis; teaches patients how to care for their stump, how to spot developing problems and how to care for them if they occur; and checks to see that the prosthesis continues to fit properly.

"Since the stump continues to shrink over time, a prosthesis that fits correctly now may not fit so well in three months," says Susan Kram-Kumler, RPT, director, physical therapy, Johnston R. Bowman.

Five to seven patients attend each clinic meeting, so individualized care is assured. Three-month checkups and nine-month follow-up exams are offered, and those who need more assistance can be referred to the outpatient physical therapy unit.

"We teach patients mobility and strength skills that are adapted to the needs of the elderly," Kram-Kumler says. "We can also show them how not to put too much stress on their remaining limb. The result is increased mobility and independence for the patient."

Independence is also the advantage offered by Communi-Call, a voice-to-voice communication system which allows the homebound to get help in case of emergency within 45 seconds over a WATTS line, 24 hours a day.

The Communi-Call system consists of a communications unit connected to a subscriber's telephone and a pendant transmitter the subscriber wears which is effective as far as 200 feet away from the unit. By pressing a button on either phone or pendant, the client contacts the system's Support Center at the Healthcare Technology Corporation in Connecticut.

The Support Center's monitoring staff has access to extensive computerized records about the client, including names of friends, relatives and neighbors, as well as basic medical information. The staff will summon help for the subscriber in case of emergency and will stay on the line until help arrives.

But Communi-Call is not just for emergencies. Subscribers can use the system during situations which concern them, such as getting into and out of bed; the staff person will stay on the line to make sure everything goes smoothly.

"Our homebound patients feel much more independent and secure knowing that all they have to do is push a button and someone is on the phone who can help them, no matter what the problem," says Doris Schlesinger, M.S.W., Communi-Call coordinator. K.H.

"Baby Fae" Surgeon Keynotes Conference

Medical research and technology have created numerous possibilities for the infertile couple, the woman who cannot carry to term and the less than perfect infant. Those options were the focus of a two-day symposium in October which featured Leonard L. Bailey, M.D., who made history a year ago when he transplanted a baboon heart into Baby Fae.

The conference, titled "Blue Ribbon Baby: Quality Care from Conception through Birth," attracted medical and nursing professionals from around the country. It was cosponsored by Rush-Presbyterian-St. Luke's Medical Center's Section of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, and the Department of Obstetric/Gynecological Nursing.

Dr. Bailey, chief of pediatric cardiac surgery and director of the cardiothoracic surgical research laboratory at Loma Linda University in California, detailed the steps leading to Baby Fae's surgery.

Baby Fae, whose heart was not completely developed, had what Dr. Bailey described as "the worst kind of heart disease that an infant can be born with"—a disorder called hypoplastic left heart syndrome. It comes in a variety of forms, all incompatible with survival, and accounts for about one-fourth of all deaths from cardiac disease in the first month of life.

Palliative surgery was introduced in 1978, not as a corrective operation, Dr. Bailey explained, but as a way to help these children live for a few more years. However, 30 percent of these babies also have right heart anomalies that preclude successful palliation. It is a complicated and difficult surgery, done in two stages, and, thus far, only one infant has survived the second stage.

Dr. Bailey suggests, instead, that cardiac transplantation "is the only reasonable way to deal with these babies." The difficulty is a lack of human donors, "so we have to look elsewhere."

He has conducted extensive research with cardiac xenotransplantation in newborn animals (xenotransplantation involves taking the organ of one species and transplanting it into another species). Newborns, Dr. Bailey notes, are special individuals immunologically because their immune system is intact, but immature (and therefore not as quick to reject an organ).

"We've been able to demonstrate," Dr. Bailey added, "that animals (with transplanted organs) grow and function normally, so it's conceivable that transplanting in the newborn stage could be the first and last operation a baby would need for a rather devastating disease."

After years of study and research Dr. Bailey and his colleagues determined that the "only practical donor source for these babies is baboons."

With careful screening, a suitable match was found for Baby Fae from a specially created donor panel of baboons. A difficulty was that Baby Fae had type O blood, which is rare in baboons. The donor had type AB blood, "but all the other things lined up beautifully so we felt it was reasonable to go ahead. It was a decision that would come back to haunt us."

Baby Fae nearly died the night before surgery. But the operation went well, she had an excellent recovery and there were 12 to 15 days that were "perfect," Dr. Bailey said. At about the third postoperative day, the regional organ procurement agency was set in motion, but a human heart was not available at any time during her lifetime.

Baby Fae lived for 20 days after surgery. The autopsy showed almost no graft rejection. Instead, a major problem resulted from crossing the blood barrier.

Since then, the protocol for the procedure has been revised "to improve the long-term outlook of this effort," Dr. Bailey said. A special breeding program is also being set up to develop a line of baboon donors with type O blood.

Dr. Bailey and his colleagues have spent the past year trying to isolate all the various factors involved in xenograft response, which is not clear in the literature. They are taking the additional step of submitting the revised protocol for the procedure for review by the National Institutes for Health and as soon as that's approved, another Baby Fae surgery could be performed. Dr. Bailey speculated it would be sometime soon.

"I think that one day—in my lifetime, at least—we're going to have a bunch of kids going off to school with baboon hearts. And their families won't care (about the baboon hearts) and by that time no one else will really care either. They'll just be glad their kids are growing up like everyone else on the block."

Sixteen different presentations were featured during the conference which focused on a broad range of topics including in vitro fertilization; diagnostic tools in the perinatal period; the impact of a national health policy for care of high-risk infants; ethical consideration in resuscitation of a very low birth weight infant; and predictors of a positive parent-child relationship. KK-K.

Programs Aid Rush Neighbors

Rush-Presbyterian-St. Luke's commitment to the community has fostered the development of scores of programs for residents of the Medical Center neighborhood.

Some are aimed at providing food and clothing for the needy. Others promote health and education; encourage teens to continue studying toward a career; offer physicals and health screenings. In all, more than 50 programs are sponsored each year.

"We work with the idea of helping to improve the well-being of our neighbors," says Reginald Adams, better known as "Hats," who has headed the Medical Center's Department of Community Affairs since it was first established in 1971. "We've got programs and projects for all age groups."

Among the most successful is the holiday Adopt-A-Family program, now a tradition with Medical Center employees.

It began three years ago as the Medical Center started planning its annual Christmas celebration for employees, explains Carol Zigman, assistant director of community affairs. "An employee at one meeting said she'd really rather be involved in some sort of giving program and the idea caught on. So instead of concentrating on a holiday party, we decided to offer employees a chance to give."

And give they did. That first year, 700 employees took part in the program, "adopting" 90 needy families and providing them with food, toys, clothes and other presents. Enthusiasm has continued to grow and this past Christmas nearly 2,000 employees played "Santa" to 175 families.

One of the Medical Center's newest efforts is the Women's Health Congress (WHC), established in June. One of its first projects was the "Taste of Good Nutrition" program that attracted more than 1,000 Medical Center neighbors.

To help those who are trying to succeed "despite life obstacles," WHC is developing a "Challenge Scholarship Program" for those who want to earn a GED certificate, attend college or receive job training. Plans are also being finalized for a citywide health conference, entitled "Not for Women Only," in November.

But that's not all WHC is planning. A cook book of low-cost/easy-to-prepare nutritious meals is in the works; a program of health education workshops is being tailored specifically for teens who will be encouraged to attend with their parents; and a preventive health education and family life manual is being developed.

"What's exciting is that so much has been accomplished in less than six months," says Ava Salonis, M.Ed., community health education coordinator, who organized the group and serves as its coordinator.

"We've got 40 members who attend meetings regularly. Some represent social service agencies that the Medical Center routinely works with and the rest are concerned minority women. All are 'doers' and we're determined not to put any limits on what can be done."

That same kind of determination and positive attitude is reflected in a fledgling project that the Medical Center has begun with El Valor, a community agency serving the physically and emotionally handicapped in the Pilsen neighborhood, adjacent to the Medical Center.

The project is designed to help the handicapped "get into the mainstream" by offering on-the-job training in either general clerical skills or housekeeping at the Medical Center. Wage and salary was the first section to hire a clerk under this program.

"What's being done to serve the community is not limited to what the community affairs department is doing," Adams is quick to add. "We've got a lot of people here at the Medical Center who really care about our neighbors." KK-K.

First In Vitro Baby Nears First Birthday

On March 4, 1986, Tiffany Lynn Autrey of Bolingbrook, Illinois, will be one year old. Tiffany is the first baby of the Medical Center's in vitro fertilization (IVF) program, begun in November, 1983.

Her parents, Brenda and John Autrey, had been trying to have a child for several years. Because of a tubal pregnancy in 1977, Brenda lost one fallopian tube. Doctors also discovered that she lacked the second tube, making natural pregnancy impossible.

Brenda was one of the first candidates in the IVF program. The first IVF attempt for the Autreys (and the second in the program) was in January, 1984. This first attempt failed, but in June, 1984, the Autreys decided to try again.

For Brenda's second try, the IVF specialists modified the timing of the egg retrieval and successfully recovered four eggs.

"The fertilization rate for eggs is

about 60 percent, and each fertilized embryo has a 12 to 15 percent chance of implanting and developing once it's returned to the uterus. So the more eggs you harvest, the greater the chance for a pregnancy," says Ewa Radwanska, M.D., who is co-director of the program with W. Paul Dmowski, M.D.

Five hours or so after the laparoscopy was performed, Brenda's eggs and John's sperm were combined. Of the four fertilized eggs which began dividing, one divided more rapidly. That egg most likely became baby Tiffany.

For the next three months Brenda's pregnancy was followed by Drs. Dmowski and Radwanska. Then, as Tiffany developed normally, Brenda had obstetrical care under the direction of Stavros Douvas, M.D., assistant professor, obstetrics/gynecology.

"I had a petty sedentary pregnancy" recalled Brenda. "I gained 50 pounds and had no special diet restrictions. Also, I quit my job." Added John, "We didn't want to take any chances." Tiffany was born at 12:49 p.m., March 14, by Cesarean section and weighed a respectable 8 pounds, 13 and one-half ounces. Dr. Douvas led the delivery team.

Everyone—parents, doctors, nurses and scientists from the IVF program—agreed it was "a miracle." The parents posed with Tiffany at the nursery window for a photographer from the *Chicago Tribune* who came to record the event.

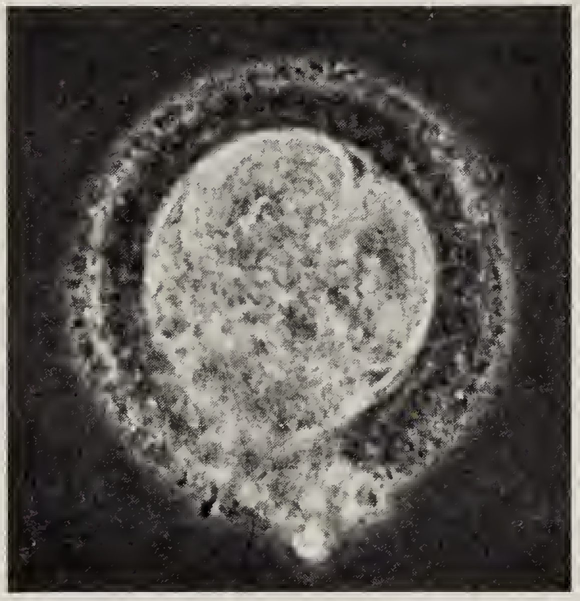
As Tiffany approaches her first birthday, Brenda reports "It's amazing to watch her grow. She's pulling herself up on to her walker, and can say 'mama', 'da-da', and 'bye-bye'." Tiffany has two lower teeth and will soon have two upper ones to match. She weighs about 18 pounds and "loves her food, just like her mom," says Brenda.

"It seems like yesterday that I had her," Brenda continues. "The IVF program is great to help people like us who don't have any other option."

There are about 500,000 couples like the Autreys who are prevented from having babies normally because of the women's blocked or missing fallopian tubes. The IVF program at Rush currently has 75 women enrolled. They range in age from 23 to 42.

Although the process is difficult, everyone agrees the joy of a birth—a Tiffany Lynn Autrey—is more than worth it. C.E.

In vitro baby, Tiffany Autrey, at six months and at embryo stage.



Alzheimer's Program Aids Patients, Families

Families concerned that a loved one might be suffering from Alzheimer's Disease can turn to Rush-Presbyterian-St. Luke's Medical Center, which has established one of the first programs in Illinois to offer both a complete medical evaluation for the illness and patient management planning.

The Alzheimer's Disease Clinical Program was developed to address the problems of the illness in a comprehensive, coordinated manner, explains James A. Schoenberger, M.D., chairman of the Department of Preventive Medicine and program director.

While the illness is not the inevitable consequence of aging, it is more likely to occur in older people and, therefore, Dr. Schoenberger notes, is becoming more and more of a concern nationwide as the aging trend continues.

Alzheimer's Disease gradually robs its victims of their mental capabilities. "It's a disease of tragic proportions for both the patient and the family," Dr. Schoenberger says.

"Typically, the Alzheimer's patient sees a series of doctors over a span of months or even years before the diagnosis is finally made. Then the family has to find out for itself what services are available.

"Our program offers a comprehensive evaluation and also directs families to the support necessary to live with the problem. It's designed to spare a lot of grief, agony and running around."

There is still no cure, but careful medical evaluation is crucial to rule out treatable illnesses that mimic Alzheimer's, according to Jacob Fox, M.D., associate professor of neurological sciences.

A recognized authority on the illness, Dr. Fox is clinical director of the program which offers a complete range of tests including CT scans, when necessary, to detect loss of brain cells, electroencephalograms to measure brain waves, and neuropsychological evaluations of memory, speech functions and cognitive abilities.

One of the first signs of Alzheimer's Disease is a problem with memory. Alzheimer's victims have difficulty finding the right word to say or write; they might get lost even in surroundings that are relatively familiar. As their problems with speech, language, comprehension and motor skills worsen, they eventually become unable to take care of themselves.

Once Alzheimer's is diagnosed, patient and family return to the Medical Center for subsequent visits with a team of experts including a neurologist, psychologist, social worker and others, to discuss what should be done now, what they face in the future and what resources are available to them.

The program also includes long-term follow-up. Medical and surgical problems will be referred to other facilities at Rush-Presbyterian-St. Luke's, and hospitalization, when needed, can be provided at the Medical Center's Johnston R. Bowman Health Center for the Elderly.

Research will be conducted under the direction of David Garron, Ph.D., professor of psychology and social sciences, who also heads the team of experts conducting the psychological testing.

Patients will be entered into a computer-based registry which will allow for epidemiological study into genetic, demographic and environmental influences that may be risk factors in the development of Alzheimer's. Controlled clinical trials of new drug treatments will also be conducted.

"Forty years ago when I was in medical school," Dr. Schoenberger notes, "coronary heart disease was thought to be the inevitable consequence of aging. Then came the epidemiologic studies that showed you could identify in advance the people more likely to develop heart attack and the multiple risk factors causing the disease. Public health measures followed, reducing the risk of the population at large and, in the last 15 years, we've seen a 25 to 30 percent reduction in deaths from heart disease. If we knew that much about Alzheimer's disease, we could probably do the same thing. That our ultimate goal." KK-K.

MS Drug Study Shows Promise

Wm. Angus Shorey is a young man with multiple sclerosis. His disease manifests itself primarily in his walking. He can take only four or five steps before he needs to rest, and his gait is characterized by a major limp in his left leg. Sometimes, it's hard for him to lift that foot to clear the floor.

Shorey is one of 12 patients who participated in a Medical Center study to determine if a drug called 4-aminopyridine (4-AP) could improve the symptoms of multiple sclerosis patients. After an injection of the drug, Shorey was able to walk faster and longer, and his gait improved markedly. Gradually, as the drug's effects wore off, his normal state of walking returned.

Ten of the 12 patients similarly benefited from injections of 4-AP, with the improvements lasting from two to four hours. The drug improved walking for patients like Shorey who previously could stagger only a few steps and vision for some patients who were legally blind.

These results of the 30-month study were presented last fall at the annual American Neurological Association meeting. The Multiple Sclerosis Center's team of researchers includes Floyd A. Davis, M.D., the Robert C. Borwell Professor of Neurology, and director of the MS Center; Dusan Stefoski, M.D., assistant professor, neurological sciences; Margaret Faut Tyszka, D.N.Sc., instructor and assistant chairperson, operating room and surgical nursing; and Charles L. Schauf, Ph.D., professor, neurological sciences and physiology.

"We based the study on the long-known observation that the condition of many MS patients improves in cool weather and gets worse in hot," says Dr. Davis. "Our theory is that temperature affects the transmission of impulses, so we looked for drugs that would duplicate the effects of cooling without changing a patient's body temperature."

Scientists believe MS is caused by a condition in the immune system causing it to attack the fatty sheath around nerves (myelin), stripping the nerves of their insulation and causing them to short circuit. MS has no known cure, and medications to relieve its symptoms are only partially effective.

"This drug works because it boosts the energy of the nerve impulses so that they can keep transmitting along the nerve fibers even where myelin is missing," says Dr. Davis. "This is basically what hypothermia, or cold therapy, does. It prolongs the nerve impulse and gets the nerve to work better."

In an effort to prolong the effects of the drug, Dr. Davis has started another study with an oral version of 4-AP.

"We have several goals for the new study," he says. "We want to know if we can get the same effects from the drug in oral form, if we can maintain the effects by giving repeated dosages of the chemical, and if there are any side effects. There's a lot of work to be done in this area, but I've never been more optimistic that we're onto a treatment strategy that will pay off for multiple sclerosis patients." J.P.

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Bruce Rattenbury, *Director of Public Relations*

Editorial Staff
Nancy K. Gallagher, *Editor*
Carmeline Esposito
Kris Hansen
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Debra Williams

Design: Leo A. Rotelli

Photography: David Joel, Jean Clough

Cover Illustrations:
Front cover: Rona Talcott
Back cover: Joseph Ficner
Illustrations (pp 21, 25) Heidi Hoffer

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Rush-Presbyterian-St. Luke's Medical Center
1753 West Congress Parkway
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